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Equipment for Canada

PRELIMINARY APPROVAL SCHEME

IN recent pronouncements Ministers have insisted that much more must be done by British manufacturers to increase exports to hard currency countries. As has been pointed out before, electrical manufacturers are not well placed in this regard because the principal countries concerned have well-established electrical industries of their own. All the same, the markets are being studied and there have been electrical successes.

Conformity with Requirements

The Engineering Mission to Canada earlier this year reported that there was quite a good scope there for British manufacturers if they could meet American competition and conform to the rather rigid Canadian requirements. This matter of conformity came to a head with the decision to put on a strong exhibit of British machine tools at next year's International Trade Fair in Toronto. Many manufacturers had experienced great difficulty in adapting their electrical equipment to meet Canadian requirements and there were instances of machine tools having been returned because their driving and control gear did not comply with the rules.

It is obviously an unsatisfactory arrangement which permits equipment to get so far and then turn out to be unsuitable and while the Engineering Mission was in Canada Mr. D. M. Buist (Export Director of B.E.A.M.A.), who was the electrical representative, took the opportunity of discussing the matter with the Canadian authorities. Tentative proposals were made for instituting a testing system on this side of the Atlantic in order that British manufacturers should be in a better position to rectify any variations from Canadian requirements before plant was shipped.

To follow up this preliminary agreement upon principles Mr. Buist, accompanied by representatives of the B.E.A.M.A., the Machine Tool Trades Association, the Cable Makers' Association and the British Standards Institution, returned to Canada in October and, as we reported last week, a firm agreement was arrived at.

Help from Canada

This provides that the B.S.I. will act as the agent for the Canadian Standards Association in this country and will conduct all the preliminary testing of equipment before it is finally approved by the C.S.A. in Toronto. The scheme will begin early next month when two C.S.A. engineers will arrive in London to get it going. The intention is that one of them shall remain here to train two B.S.I. engineers to take the work over. Existing facilities will be employed; so far as possible the testing will be carried out in manufacturers' own works—the most convenient way of doing it.

Although the scheme largely derives from the experiences of makers of machine tool equipment it will not be limited to the testing of this equipment. The great advantages likely to accrue from the system will attract the attention

and support of more and more manufacturers. One probable effect can be foreseen: British producers who have been scared of entering the Canadian market because of the special requirements will be encouraged to alter their views by the facilities now becoming available. It is also possible to visualize a wider future scope for the B.S.I. preliminary approval system. Canada is not the only country with standards and regulations which differ from ours and sometimes raise serious handicaps to export trade.

POWER ENGINEERS' SALARIES

THE news that a revised salaries schedule is to be put into operation will be welcomed by members of the technical staffs of the electricity authorities. The matter has been debated for a very long time and members of the Electrical Power Engineers' Association were restive. The schedule is applicable to the staffs of the Electricity Boards, and a list of "key" designated grades for power station staffs is being worked out.

THE RURAL SCENE

IN this issue we publish a statement by the British Electricity Authority upon the position with regard to the extension of electricity supplies to rural areas made to the National Farmers' Union and other bodies concerned in the matter. It is stated that it is the earnest desire of the Authority and the Electricity Boards to extend their service; four of the Boards have drawn up schemes estimated to cost about £17 million altogether, the largest being that of the Merseyside and North Wales Board (£9 million). Attention is drawn to the financial and other problems involved and it ends on a note of uncertainty as to the effects of the Government's economy measures.

UNATTAINED TARGETS

IT was the desire of the British Electricity Authority to raise the country's generating plant capacity this year by 1,100 MW. Early realization that this was an impracticable aim led to the production of a more realistic figure, 800 MW, a "target" arrived at after consultation with manufacturers of plant. This has proved too optimistic, for insufficient allowance was made for various hitches, notably the difficulties in getting boiler-house equipment on time. As a result, the increase in capacity will be only about 700 MW by the end of the year, sufficient to keep pace with the increase in the still-unsatisfied demand but not enough to reduce arrears or enable some of the older plant to be taken out. Improvement is hoped for and improvement is imperative.

WIND POWER

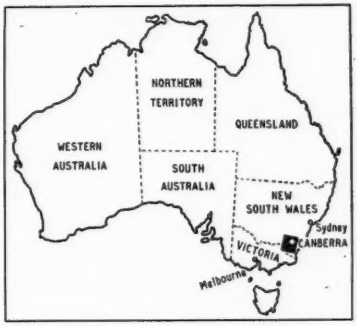
JUST two years ago the E.R.A. Wind Power Generation Committee was set up. Five months ago it presented a report on the potentialities of small plant of this kind. A preliminary report on large-scale generation by this means (an order for a 100-kW experimental machine has been placed) is summarized on another page. It is evident from the latter that this E.R.A. research has aroused keen interest in the subject, which is very widespread. There appears to be a firm conviction among some engineers, both at home and abroad, that the proposition should be economic, at least at some places in the British Isles, mainly as a means of saving valuable fuel.

THE STRIKE

As we go to press the country is experiencing its first serious power station strike since 1926. The stoppage of work at Brimsdown, Littlebrook and Taylor's Lane originated in dissatisfaction with the terms surrounding the 1½d an hour general increase made last May which involved the "merging" of certain extra payments. Impatience at the slow pace of the negotiating machinery was the immediate cause of the strike but this does not justify the ignoring of the trade unions, which have regretted the men's action. The walk-out at Barking was "sympathetic" and due to the use of Service men to keep the supply going; this was even less justifiable, for no Government could let matters take their own disastrous course. We hope that by the time this appears the strikers will have agreed to return to reasonable measures to secure the consideration of their case and that the negotiators will speed up their action.

Water Power in Australia

Commencement of the Snowy River Hydro-Electric Project



Location map indicating area (black square) of combined water-power and irrigation project

NEVER before in its short history has the Commonwealth of Australia embarked upon a power development scheme of such magnitude as that authorized by the Snowy Mountains Hydro-Electric Power Act, 1949, which is likely greatly to influence the industrial and agricultural prospects of three States, particularly the south-eastern corner of the continent.

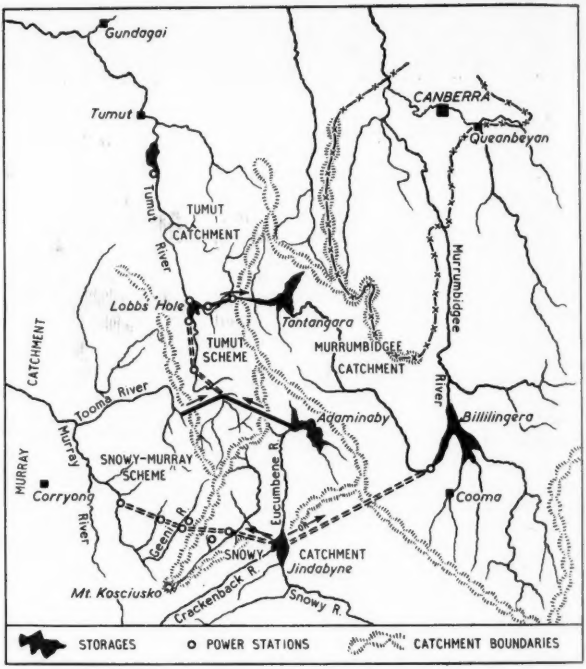
Constructional work was initiated on 17th October, 1949, when the Rt. Hon. W. J. McKell (Governor-General of the Commonwealth) detonated an explosive charge at the bottom of a deep gorge in the Eucumbene River valley where one of the dams is to be built.

Before pioneers drove their flocks of sheep and herds of cattle through the passes to territory made fertile by westerly flowing rivers, Australia was a narrow land cramped between the Pacific coast and the mountain chain which skirts the eastern seaboard of the continent. The peaks of that dividing range are dominated by Kosciusko, Australia's

Site of first and largest dam to store one million acre-feet in Eucumbene Valley near Adaminaby (pop. 700)

tallest mountain, source of the mad-cap Snowy River which starts east, turns south, then west and south again to fall 7,000ft on its 300-mile way to the sea.

The Snowy River is always full, which is unusual in a country where rivers lose themselves in the thirsty soil; with its tributaries, it drains 700 sq miles of the Eastern Alps, most of which is snow - covered every year from May to November and thickly carpeted with moss and absorbent humus that release the melted snow slowly. Over a period of forty years the least rainfall has been 30in and the most over 80in yearly.



Key map of Federal Government water conservation area indicating the proposed generating station sites, storage reservoirs and catchment boundaries in relation to the Australian Capital Territory (Canberra)

Nowhere else in Australia is there a catchment area which is quite like this, but the Snowy took the wrong turning and so is to be diverted west to provide more water for irrigation with electricity for Sydney and Melbourne while helping to industrialize north-eastern Victoria and south-eastern New South Wales. Consequential decentralization will have a twofold effect; it should relieve the overcrowding of cities and, more important just now, enable key industries and defence research to be less vulnerably situated away from the coast. Incidentally the power stations themselves will be of "mostly underground" construction.

Spasmodic proposals between 1915 and 1944 culminated in discussion of the inter-state aspect (for the first time in 1946) on a national basis. Representatives of N.S.W. strongly advocated diverting the Snowy waters into the Murrumbidgee River for irrigation. Representatives of Victoria felt that diversion to the Murray River could also provide much power with financial advantage which could be capitalized at over £40 million.

A technical committee set up to decide which of the rival schemes should be adopted reported in November, 1948, after fuller investigation, in favour of the combined proposition and showed that the potentialities of the project were much greater than had been appreciated. By June, 1949, all parties were in agreement.

The country drops away steeply to the west of the mountains. In some summer months the flow has been only one-tenth of the average and in one spring month it was nearly five times the average. The Snowy River discharge has averaged 800,000 acre-ft*/year over an eleven-year

* One acre-foot is the quantity of water needed to cover one acre to a depth of one foot.

period. Regulation will thus necessitate storage by high-level dams of 1,000,000 acre-ft capacity, but only two major sites are available. One is at Jindabyne on the Snowy River and the other near Adaminaby on the Eucumbene River, the latter enabling other waters to be added to the initial proposals.

Thus diversion of the Tooma (tributary of the Murray) into the Tumut (main tributary of the Murrumbidgee) will form a pond above the first power station, to be connected by a two-way tunnel with the Adaminaby reservoir so that the direction of flow can be reversed to accumulate or withdraw surplus tributary water for both irrigation and power production. While the Tumut and Snowy schemes are independent, the former will augment the latter. Two major projects have thus emerged, involving the building of 16 power stations.

Scheme A.—The Tumut development comprises four major dams, 45 miles of tunnels, 160 miles of race lines and seven power stations of 1,020,000 kW maximum firm capacity.

From the Eucumbene dam at Adaminaby (1,000,000 acre-ft capacity) there will be a tunnel to the Tumut, five miles long and of over 30ft diameter; a tunnel from the Tooma to the Tumut,

Taking sightings on site of a major dam near Adaminaby on a tributary of the Snowy River

There will be a power station at West Blowering on the lower Tumut River and an irrigation dam

A dam will inundate this tiny mountain township of Jindabyne situated at the foot of Kosciusko (7,328ft) which is Australia's highest mountain

five miles long and of over 25ft diameter; two tunnels down the Tumut valley, 12 miles, to stations T.1 and T.2.

From the dam on the upper Murrumbidgee (300,000 acre-ft capacity) a tunnel, eight miles long and of 19ft diameter, will go to station T.3 in the Tumut valley; thence for five miles, 24ft diameter, to station T.4.

A dam at Lob's Hole on the Tumut will create head (top 20ft only) with 20,000 acre-ft storage for station T.5, whence a 30-mile race line will go to station T.6 near Talbingo. A dam at Blowering on the lower Tumut with station T.7 will regulate water for irrigation needs.

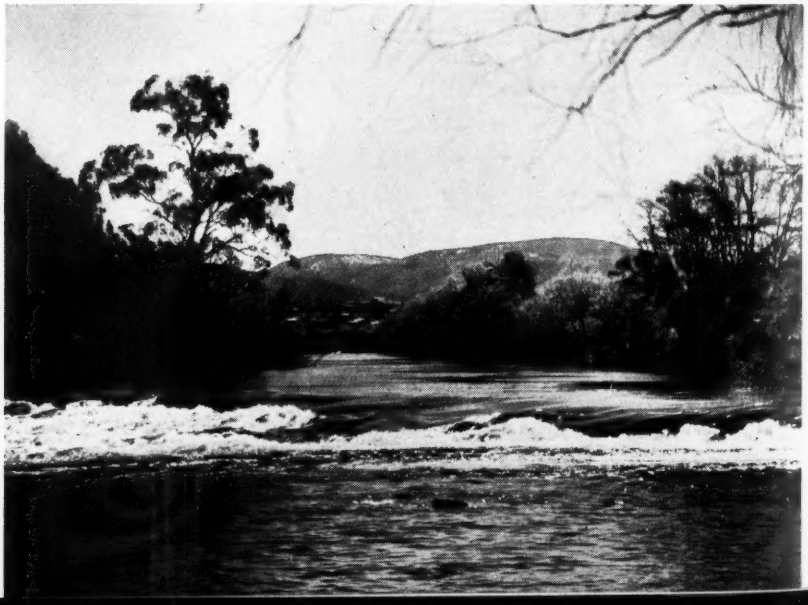
Some 130 miles of race lines will also be constructed in the upper catchments of the Eucumbene, Tumut, Toome and Murrumbidgee Rivers.

Scheme B.—The combined Snowy-Murray development will consist of three major dams, 39 miles of tunnels, 325 miles of race lines and nine stations in seven power houses of 1,600,000 kW maximum firm capacity.

This three-part plan concerns the use of water after the Eucumbene has been diverted into the Tumut. About 45 per cent of the water diverted will be required to replace that drawn from the Tooma for the Tumut scheme. The balance will be extra water available for irrigation in the Murray Valley.

Part B(i).—From the main dam at Jindabyne (1,000,000 acre-ft capacity) a tunnel 22 miles long and of 30 to 40ft

The Snowy River near Jindabyne which falls 7,000ft in 300 miles and with its tributaries drains 700 square miles of snow-covered country



Smoke from explosion that moved the first earth, showing crest of the dam at a height of 150ft which finally will submerge the Eucumbene River for diversion to the Tumut River

diameter will go to station M.6 on Bogong Creek, a tributary of the Geehi River.

A shaft (1,000ft deep) at Island Bend on the Snowy River will drop water to station M.3 near the bottom; another shaft (100ft deep) will have station M.5 (low level) at its base, both discharging into the main diversion tunnel from the dam to station M.6, whence a tunnel seven miles long and of 44ft diameter will go from Bogong Creek to station M.7 and the Swampy Plains River.

Part B(ii).—Water from the upper levels of the Snowy catchment will be impounded by a dam (15,000 acre-ft capacity) on Spencer Creek, whence two tunnels nine miles long will go to stations M.1 and M.2 (low) while races north of the Snowy River will serve station M.2 (high).

Part B(iii).—A race will bring head streams of the upper Geehi River to pondage at Windy Creek for station M.4. Water from this station and another on the opposite side of the Geehi will flow by two races (both collecting from adjacent catchments) into a pipe-head pond for station M.5 (high) and a dam on the upper Murray River will regulate the outflow from these stations according to irrigation needs.

Extra water to be made available yearly for irrigation will be 1,200,000 acre-ft in the Murrumbidgee Valley and 500,000 acre-ft in the Murray Valley.

The total firm power capacity will be 2,620,000 kW. This will mean as much to industry as 4,000,000 tons a year of black coal, one-third of the present annual output of black coal in Australia.

The first portion of the scheme, to be ready within the next eight years, will provide more than 600,000 acre/ft of water for irrigation and 720,000 kW of power.

The capital cost of this twenty-five year project (excluding transmission) is estimated to be £125 million and it is expected to show £9.3 million annual profit. The Snowy Mountains Hydro-Electric Authority which is doing the constructional work, will generate and supply electricity to the Commonwealth for defence purposes and for consumption within the Australian federal capital territory (Canberra) after which requirements have been satisfied, the States of N.S.W. and Victoria will share in the power distributed, in the proportion of two to one.

The Commissioner is Mr. W. Hudson, B.Sc.(Eng.), M.Inst.C.E. (seven years' tenure) and two assistant commissioners are to be appointed for five and six year periods respectively.

Mr. V. J. F. Brain, M.I.E.E., is chairman of the Electricity Authority of New South Wales and Mr. E. Bate is chief engineer of the State Electricity Commission of Victoria.

Large New Zealand Schemes

IT is estimated that in the next seven years expenditure on hydro-electric development in New Zealand will amount to £54,000,000. Making this statement (reported in the *New Zealand Electrical Journal*) during the course of a financial debate in the House of Representatives, the Minister of Works said that what could be done was limited by the country's manpower resources. Six projects were at present under construction, and expenditure was running at the annual rate of £6,000,000. When the Roxburgh scheme was in full construction the figure would rise to some £8,000,000.

The telephone service is also being extended and during the coming year £6,000,000 is to spent on equipment.

Views on the News

By REFLECTOR

CONGRATULATIONS are due to the South Eastern Electricity Board for the excellent "Press" secured by its announcement of reductions in lighting flat-rate charges to 15,000 of its consumers. Although the number affected is a small proportion of the total, price reductions are so uncommon that the move deserved all the publicity it obtained, particularly as it was accompanied by the Board's proud boast that it had not raised any of its charges since nationalization. I seem to recollect, however, that some other Boards reduced their flat rate to 6d some months ago.

★ ★ ★

Last week some stir was caused by a report that officials of the National Coal Board had endeavoured to "censor" a play which contained "misrepresentations" of the Board's conduct. The theatre management refused to alter the play. I hope that the British Electricity Authority and other boards will not be so sensitive as the N.C.B. Otherwise it is not difficult to imagine a row of stalls occupied by watchful representatives of national boards at future first nights. The Christmas pantomimes should provide plenty of material for such censors—official in one sense, unofficial in another.

★ ★ ★

The fears of electrical contractors that they will be put out of business by the undercutting of the Electricity Boards seem to have little foundation if one is to judge by frequent complaints of the Boards' charges. This may be due, of course, to the natural tendency of customers to make a fuss when dissatisfied but to keep quiet when things are going well. There seems to be scope for "private enterprise" in street-lighting maintenance contracts, for there are many grumbles that charges have risen steeply since the work was taken over by the new authorities. The latest example comes from Scunthorpe (Lincs.), where the Council has refused to pay more than £750 of a bill for £1,199 put in by the Yorkshire Electricity Board for the maintenance of the town's lighting.

★ ★ ★

At a meeting of the Bridgwater Rural Council the vice-chairman stated that "because of the shortage of generating plant the Board [presumably the Electricity Board] was directed by the Ministry of Fuel and Power not to extend supplies even if lines were passing the door." This was after a member of the Council had said that in one part of the area there were houses which had been wired for four years and the tenants had bought equipment. There seems to be something strange in this Ministerial direction.

★ ★ ★

Time and Tide has published a number of letters upon the North Wales hydro-electric proposals. One of them tells how the Swiss when a lake and a valley were "threatened" by hydro-electric schemes raised enough by public subscription to buy the lake. The writer admits that it is impossible to buy the whole of "threatened" Wales. This seems a pity for it would enable the protesters to back their opinions with hard cash.

★ ★ ★

"He advanced through several positions until 1917 when he organized the employment department, with one clerk as his assistant. He built it into a carefully organized department with five divisions." This is not the story of a rise of a department of the B.E.A. or the Government but an extract from the *Edison Electric Bulletin* relating to one of the leading American electricity supply companies.

★ ★ ★

A Christmassy idea from an evening paper:—

> "Your front door can say Merry Christmas if you decorate it with a small tree. Cut the back so it will hang flat and trim it with ornaments that will stand the weather. If you fix it with lights, by threading the flex through the letter-box, so much the better. Children get a kick out of that one."

They probably will and so may other callers.

Correspondence

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for the opinions expressed by correspondents

Shocks from Loudspeakers

IN your issue of 18th November "Reflector" states that shocks from loudspeakers where a low impedance system is used must be due to some fault developing in the transformer or wiring. This is not true, particularly for the metal (usually Admiralty surplus) type speakers found in the bathrooms of enthusiastic, but misguided, radio listeners.

Many radio sets have one side of the secondary of the output transformer earthed to chassis, and this, of course, may be at full mains potential if the set is for a.c./d.c. working or uses an autotransformer. To rely on the small air gap or very thin shellac insulation of the speech coil in the speaker is very dangerous under these conditions, particularly as speakers apparently working very well may have the speech coil rubbing on the metal pole-pieces, thus transferring the voltage to the case. A conventional cone-type speaker will, of course, give the same result, and conceivably be more dangerous, since there is no possibility of the frame, securing screws, etc., being at earth potential whereas the metal type may by chance be earthed.

If loudspeakers are to be used in bathrooms, I suggest the users should always take the precaution of earthing the frame of the speaker, whatever the type, and to protect the receiver and speaker install a fuse of about 500 mA in one lead of the input to the speaker.

*London, E.*11. W. STEELE.

This Earthing Fetish

THERE does not seem to be much to reply to in the correspondence following the above article, which may well indicate a large measure of agreement with the points made. Mr. Raynor has answered Mr. Milne and confirmed the main points, although disagreeing with my contention that mains faults may cause fires in internal wiring.

Although full technical details are not yet available, we should consider the occurrences at Hastings last month when apparently the earthing of an overhead trolley line started fires in four houses in one road, due to melting of gas and water pipes. It is reasonable to assume that whatever leakage potential was extended on to the water pipes also appeared on all earthed equipment in the four, and other, houses. Although not an exact parallel to the point I made, this case will provide some food for thought.

I am not particularly worried about heavy-gauge screwed steel or aluminium installations in industrial and other large premises, where first-class workmanship is usually employed, but I do feel that the competitively priced light-gauge conduit systems now going in in thousands on housing estates may well be something of a menace. The suggestion that operatives should now be offered incentives for speedy work cannot but represent grounds for further disquiet; surely some official report or investigation is overdue.

In this connection the E.R.A. commenced investigation into the electrical continuity of conduit joints and two reports, F/T152a and F/T157, appeared in 1943. It is understood that further work has been proceeding, but the lapse of six years, even allowing for the war years, before further reports are available is, perhaps, significant.

In the *Farmer and Stock-Breeder* for 22nd November, there was an account of the electrocution of ten cows, and the same paper for 6th December mentions a similar occurrence in connection with five cows. Is this really good enough, following fifty years of electrification on a commercial scale in this country, and are we prepared to class these occurrences as Acts of God and beyond our control? I cannot believe it, but they do not appear to be reported in the electrical papers.

However, as I made clear in my article, I am not so much concerned with the shock accident as with the possibility of fire resulting from our present methods. I wonder how many people acquiesce in these methods because of long familiar usage and tradition, but yet are perturbed by occurrences now becoming all too common. However, as shock and fire are bound up in the one main cause, we should, perhaps, consider it is one problem.

In reply to Messrs. Edgar and Neville, if these gentlemen will consider earth leakage protection by means of voltage-operated circuit breakers used in conjunction with separate small earth electrodes, they will find solutions to their problems. This is the most efficient form of application of this type of leakage protection. As the whole question cannot be dealt with in a correspondence column, if either of these gentlemen will write me privately I shall be very pleased to record my experiences and trials in this direction.

T. C. GILBERT, M.I.E.E.

Folkestone.

Rural Electricity Supplies

Effect of Capital Cuts

THE British Electricity Authority recently met representatives of the National Farmers' Union and other bodies to explain the policy and plans of the electricity supply industry in the light of the Government's recent decision to reduce the capital expenditure of the industry for 1950. Of the total of £25,000,000 by which the capital investment programme of the fuel and power industries are to be cut, it is contemplated that the larger part will fall upon electricity supply. The Government has indicated that there is no intention of slowing down the generating station programme, which is already restricted by limitations on physical production of plant, etc., and it is therefore envisaged that a substantial reduction will have to be made in the distribution programme of the Area Boards.

Since vesting day, the Central Authority and the Area Boards have been considering the most practicable and equitable methods for extending supplies to rural areas. The problems involved are complex, for not only do the Areas differ in the relative extent of urban and rural territory, but in the extent of rural development already achieved, in the types of country and of farming activity, in the electricity revenue which can be secured and in the nature and extent of the networks which will be required for full development.

At an early stage, the Central Authority and the fourteen Electricity Boards agreed that a comprehensive transmission and distribution system should be developed in each Area as soon as circumstances permitted. Surveys on these lines were put in hand by all the Boards and, as a result, some large-scale rural development schemes have already been announced. These include: North Eastern Board, £500,000; Merseyside and N. Wales Board, £9,000,000; South Western Board, £2,000,000; and Eastern Board, £5,400,000.

The B.E.A. and the Boards have under consideration the fundamental problem of the extent to which it is equitable, on the one hand, that the costs of the Area transmission system (urban and rural) should be borne in the general tariffs for electricity supplied and, on the other hand, the extent to which excess connection costs should be recovered from individual consumers. Moreover, the financial problems of rural development are more marked in some Areas than others. Lengthy and detailed survey work must accordingly be carried nearer completion before an appraisal is possible of the probable expenditure and revenue.

It is stated by the B.E.A. that the connection of farming premises is proceeding as rapidly as restrictions on labour and materials permit. While everything practicable will be done to meet urgent needs, it is inevitable that, with the new economy cuts, the development programmes affecting all electricity consumers will be delayed. The fullest explanation of the position has been given to the National Farmers' Union and other interested bodies and their co-operation is being sought.

B.E.A. Report and Accounts

IN the House of Commons on Monday Mr. Gaitskell, Minister of Fuel and Power, told Mr. F. J. Erroll that he had now received the report and accounts of the British Electricity Authority and expected that they would be published about the middle of January. Asked for the reason for such long delay Mr. Gaitskell said they had had considerable difficulties during the first year on the accounts side, but he did not think that they would occur in future.

Personal and Social

NEWS OF MEN AND WOMEN OF THE INDUSTRY

UNDER the provisions of the Electricity Act, 1947, the British Electricity Authority includes among its members four Area Board chairmen who are to be appointed from the Boards in rotation. The chairmen of the London, Midlands, Merseyside and North Wales, and South West Scotland Area Boards (Messrs. H. J. Randall, W. S. Lewis, J. Eccles and J. S. Pickles) were appointed to the Authority for a period of two years, expiring on 31st December, 1949.

Sir Norman Duke

Mr. N. Elliott

Mr. L. Howles

Mr. C. R. King

The Minister of Fuel and Power has now announced the appointment of the following to succeed them on the Authority for a period of two years from 1st January, 1950:—Sir Norman Duke, K.B.E., C.B., D.S.O., M.C. (South East Scotland), Mr. N. Elliott, C.B.E., M.A. M.Inst.C.E., M.I.E.E. (South Eastern), Mr. L. Howles, M.I.E.E., M.I.Struct.E. (South Wales) and Mr. C. R. King (East Midlands).

Mr. T. H. Windibank, M.I.E.E., will, on 31st December, relinquish the appointment of works director (south), Crompton Parkinson, Ltd. He will remain a director of the company with special assignments. **Mr. J. V. Daniel** has been appointed assistant managing director (works) with effect from 1st January next.

Miss Jessie Lees has recently retired from Siemens Electric Lamps & Supplies, Ltd., after more than twenty-seven years' service. She was their senior cookery demonstrator for many years and was widely known throughout the electrical industry for her practical demonstrations. Miss Lees joined the company at the Dalston Lamp Works in 1912, was transferred to the Upper Thames Street offices in 1922 and became cookery demonstrator in 1923. From then until the outbreak of the last war she gave cookery demonstrations throughout the British Isles and trained junior demonstrators for similar work. From 1939 until her retirement she was responsible for the welfare of the female staff at Upper Thames Street. A wireless set, which represented a wedding gift as well, was presented to her by her many friends and well-wishers throughout the Siemens organization.

Mr. A. F. Tyler and his family were to sail from Southampton on 15th December. Mr. Tyler joined Higgs Motors, Ltd., twenty-five years ago and has been in the London office sales department most of this time. He was also London manager for eight years. His connection with the company will not be entirely severed as he is taking up a similar position with its agents in Salisbury, Southern Rhodesia.

Thomas De La Rue & Co., Ltd., Plastics Division, announce the appointment of **Mr. E. A. Dorling,** A.M.I.E.E., as technical representative under Mr. F. T. Fletcher, sales manager, industrial sales section. He will specialize in the electrical uses of "Delaron," industrial laminated plastic. Mr. Dorling was for more than ten years sales engineer of Micanite & Insulators, Co.

Mr. V. J. Radbone retired as chairman and managing director of the International General Electric Co. of New York, Ltd., on

30th November after forty-three years' service with the organization in this country, America and India. In consequence the following organization changes have been announced: **Mr. K. K. Boynton,** European vice-president of the International General Electric Co., Inc., with headquarters in Paris, assumes the chairmanship of the London company. **Mr. B. R. Sankey,** formerly sales director, becomes acting managing director, **Mr. A. MacArthur** has joined the board, and **Mr. A. T. Neale** becomes chief European auditor, retaining his present position as financial director.

The English Electric Co., Ltd., announces that **Mr. T. E. Calverley,** B.Sc., A.M.I.E.E., has been appointed chief engineer of the Rectifier Department, and will operate from the Stafford Works. Mr. T. E. Calverley was educated at Preston and Stafford, and afterwards at King's College, University of London. He was awarded the David Salomans Scholarship by the I.E.E. in 1939-40. He served a graduate apprenticeship with the English Electric Co., and later joined the design staff of the Rectifier Department. This was followed by several years at the Cavendish Laboratory, Cambridge, as research engineer, working on engineering problems associated with the building of machines capable of producing beams of high energy particles for nuclear physics investigations. He returned from this post to take up his present appointment.

Mr. T. E. Calverley

Mr. S. A. Woods, T.D., has joined Thorn Electrical Industries, Ltd., as manager of its Lighting Division, Northern Region, with effect from 7th November last.

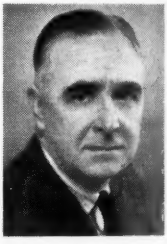
Mr. Woods is well known in the electrical industry, having been associated with G.E.C., and with Crompton Parkinson, Ltd., for whom he was manager of the Liverpool Branch. Mr. Woods is commanding officer of the Territorial Divisional Signals Corps in Manchester.

Mr. S. A. Woods

Mr. N. A. Collard has been appointed to the staff of the Hamworthy Engineering Co., Ltd., and British Combustion Equipment, Ltd., and will assist the directors in developing the sales organization of both companies. Mr. Collard was formerly a deputy director of John Thompson Water Tube Boilers, Ltd.

The **J. & P. Staff Association** held its annual dinner and dance at the McLeod Restaurant, Woolwich, on 9th December; over 400 members and guests attended. Mr. G. Leslie Wates, J.P., chairman and joint managing director of Johnson & Phillips, Ltd., was in the chair, and in proposing the toast of the Association referred to his claim to be "father" of this "lusty infant." The exchange of information between the management and the staff council was of great value in maintaining the family spirit in the company. In reply Mr. P. M. Hollingsworth, manager of the Cable Test and Research Department, spoke of the many benefits to the staff which had resulted from discussions between the management and the council.

Mr. A. C. Clark has been appointed sales manager to Hume Atkins & Co., Ltd., lighting fittings designers and manufacturers, of Letchworth, as from 1st November. He has had extensive experience in specialist lighting fittings over the last twenty years. For many years he was the sales engineer responsible for special lighting contracts for Metropolitan-Vickers and Harcourts, Ltd., included in which was work at Buckingham Palace, the House of Commons and Scotland Yard. Mr. Clark is at the London office of the company, 66, Victoria Street, London, S.W.1.



Mr. A. C. Clark

Mr. A. C. Gale has been appointed manager of the Liverpool district office of the Edison Swan Electric Co., Ltd.

About 150 members of the **Bristol Electric Club** and their friends attended the annual dinner at the Berkeley, Bristol, on Monday. The chairman of the Club, Mr. E. C. Willis, Sub-Area manager, Bristol and North Somerset, South Western Electricity Board, presided. Congratulating the Club on the useful part it had played during the twenty-two years of its existence, Mr. J. B. Bennett, city engineer, Bristol, said that it was an Association where men of similar interests could find a common meeting place to discuss their day to day problems. Mr. W. C. Bowler, manager Severn Vale District, Midlands Electricity Board, de-

cared that its members, now numbering over 200 formed a cross section of the electrical industry — supply engineers, manufacturers, wholesalers and contractors. Mr. H. D. Denman, managing director, H. D. Denman, Ltd., electrical wholesalers, said that the Club's objects were entirely the goodwill and good fellowship in the industry. The health of the chairman was proposed by Mr. Harper Bill, General Accessories Co., Ltd.

Over 500 of the employees' children enjoyed a Christmas party at the Willesden Works of the **British Thomson-Houston Co.,**

Children of B.T.H. Willesden employees at their annual Christmas party last Saturday

Ltd., on Saturday last. The event has been a popular annual since 1917, except for a few war years, but it never seems to lose its charm and good spirit. This year was no exception. Willing helpers saw that the little visitors enjoyed their tea and entertainment, and under the benevolent eye of "Father Christmas" the afternoon concluded with a distribution of toys, 300 of which had been made by a volunteer carpentry class in their spare time.

Mr. R. D. Farrant has been appointed sales manager of Hole Electric Co., Ltd., as from 1st December last. He was previously general sales manager of the Radio Electrical Division of Kerry's (G.B.), Ltd.

Through the generosity of the Maudslay Society, which was formed to commemorate the name of Henry Maudslay (1771-1831) the Junior Institution of Engineers is enabled to offer a scholarship, to be known as the Maudslay Scholarship, to young engineers for the purpose of assisting them in their technical education and practical training. The first Maudslay Scholarship was presented to **Mr. Jack Hope,** of Leeds, at the inaugural meeting of the Junior Institution of Engineers, held on Friday last, at the Royal Society of Arts. Mr. Hope is at present studying for a degree in engineering at Leeds College of Technology.

In announcing the appointment of **Mr. H. W. Millatt** as manager of the Weston-super-Mare District, the South Western Electricity Board described him as "A.M.I.E.E." Mr. Millatt is an Associate of the Institution.

Mr. H. S. Lewis, London manager of Richardsons, Westgarth & Co., Ltd., is retiring at the end of 1949 after 22 years' service with the company. He is being succeeded by **Mr. E. A. Eborall,** who joined the company as assistant London manager in June last.

Mr. H. Wigston has been appointed sales director of the Electrical Division of the Britannia Engineering Co. He served for many years with the British Thomson-Houston Co., Ltd., at Rugby, Watford and London, and relinquished his appointment as assistant manager, Lighting Department, at the end of September. For ten years he was chairman of the Electric Discharge Lamp Auxiliaries Council, and in addition served on many committees of the Electric Light Fittings Association; for three years he was a member of the Electrical Fair Trading Council.

Obituary

Mr. H. T. M. Angwin.—*Erda* (Australia) reports the sudden death, at the age of sixty, of Mr. Hugh Thomas Moffitt Angwin, chairman of the South Australia Electricity Trust since its formation in 1944.

Mr. Vernon Hope, J.P., M.I.E.E., chairman and managing director of Parmiter Hope & Sugden, Ltd., which he founded in 1899, died on 6th December at the age of seventy-two. His gifts as an inventor were particularly evident in the field of electric fuses and electrical fusegear generally. The best known of his earlier inventions was the "Fluvent" fuse and distribution fuseboard. His development of the "Aeroflex" high breaking capacity fuse, which he invented in 1924, led to the extension of fuses to a

The late Mr. Vernon Hope

much wider field than had been possible with earlier types, and helped to establish the practice of depending on high breaking capacity fuses for duties up to and exceeding 25 MVA. Mr. Hope was well known for many other inventions. Apart from his business activities he was a cricketer, having played for Manchester and Lancashire Second, and later captained Cheshire County Cricket Club. He became Mayor of Macclesfield in 1926, and during the time he was on the Council he served as chairman of the Electricity, Gas and Water Committees in turn.

Mr. W. H. Tew.—The death occurred suddenly on 11th December at the age of seventy-five of Mr. William Henry Tew, founder and senior partner of W. H. Tew & Co., electrical engineers and contractors, of Nottingham. Mr. Tew was a past chairman of the Electrical Contractors' Association and allied associations and an honorary life member, trustee and past chairman of the Nottingham Society of engineers.

Mr. R. C. Graseby.—The death occurred on 6th December at the age of sixty-six of Mr. Robert Constantine Graseby, M.I.E.E., F.B.H.I., who, until his retirement, just before the last war, was managing director of Venner Time Switches, Ltd., which firm he built up from its small beginning at Horseferry Road, Westminster, to its present size. He emerged from his retirement in in 1940 to undertake important war work and built various types of war vessels at Itchenor Shipyard. Later he formed, in partnership with Mr. G. A. Sharman, the firm of Graseby Instruments, which was entirely concerned with the manufacture of special war equipment. At the end of the war Graseby Instruments, Ltd., moved to the Kingston By-Pass, and Mr. Graseby was managing director until the time of his death.

The late Mr. R. C. Graseby

Mr. C. A. Magrath.—The death is reported, from Victoria, B.C., at the age of eighty-nine of Mr. Charles A. Magrath, former chairman of the Hydro-Electric Power Commission of Ontario.

Mr. George William Burt, chief electrical engineer to Gateshead Corporation for more than twenty years, has died suddenly at his home in Gateshead. Mr. Burt was sixty-four.

Wills

Mr. H. Beney, A.M.I.E.E., of H. Beney & Sons, chairman of the Eastbourne Branch of the Electrical Contractors' Association for over twenty years, who died on 22nd July last, left £1,793 gross (£1,559 net).

Mr. S. Hunt, A.M.I.E.E., late meter superintendent of Central London Electricity, Ltd., who died on 18th July last, left £4,338 gross (£4,249 net).

Mr. W. Kenyon, formerly chief electrical engineer to the Wigan Coal and Iron Co., who died on 14th July last, left £3,812 gross (£3,772 net).

Lord Queenborough, a former chairman of Siemens Bros. & Co., Ltd., and Submarine Cables, Ltd., and a director of other companies, who died on 22nd September last, left £255,276 gross (£159,715 net).

Captain A. G. D. West, television pioneer, left £14,029 gross (£12,805 net).

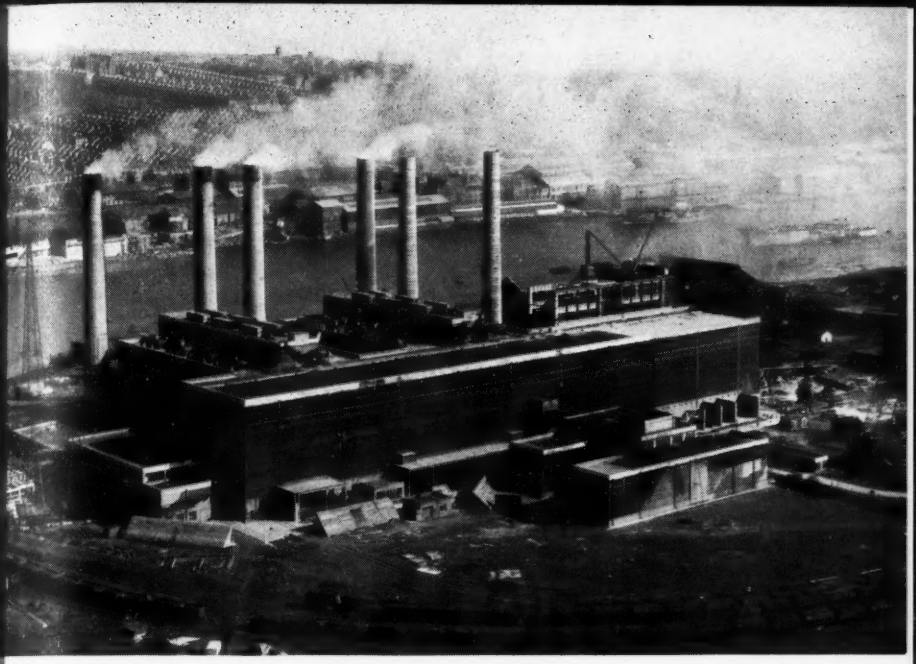
Universities and Industry

DURING the week-end 25th to 28th November, the first conference of leading representatives of British universities and industry was convened by the Federation of British Industries through its Education and Industrial Research Committee. The conference was held at Ashorne Hill, near Leamington Spa, Warwickshire, by courtesy of the British Iron & Steel Corporation and 130 delegates and guests attended.

The discussions which took place covered a wide range of subjects of interest to both industry and the universities and it was hoped that the result would be a fuller mutual understanding between the two. The topics under consideration included industry's requirements of scientists and technologists, their education and training, and also the extent to which arts garduates could be employed in industry.

Various methods of selecting arts graduates for entry into industry and their subsequent training were examined, the serious shortage of science teachers for schools being emphasized and uneasiness expressed at the possible threat to the continued supply of science students to the universities.

Other subjects were the extent to which education for management was desirable in the universities, uses to which vacation courses could be put, post-graduate courses for men proposing to enter industry and means of developing closer contacts between industry and the universities. The strengthening of university appointments boards was urged and industry was asked to supply the boards with fuller information on appointments for careers and the need for different types of graduates.



National Supply Survey

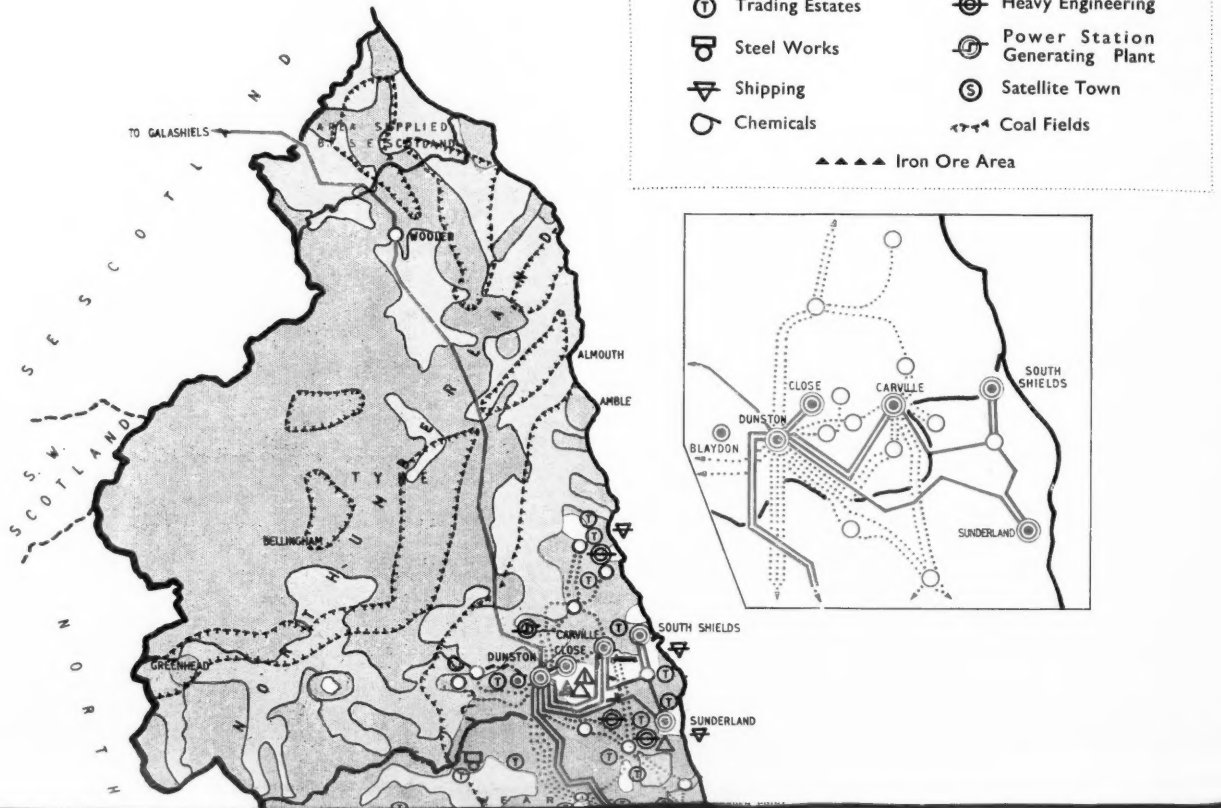
ELECTRICAL ASSESSMENT OF THE FOURTEEN AREAS

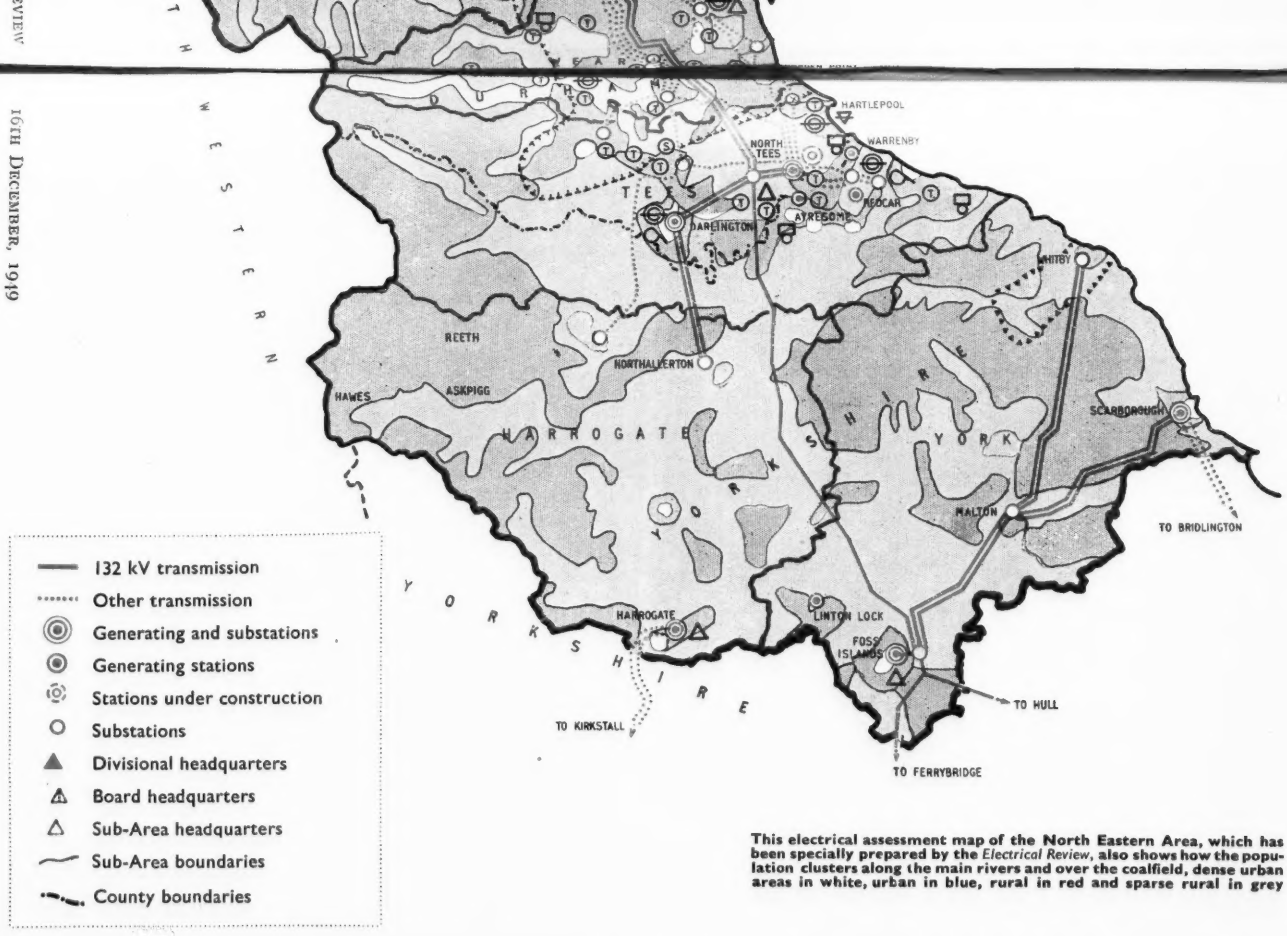
8. NORTH EASTERN AREA

THE new North Eastern Electricity Supply Area is probably unique in that before nationalization practically the whole of the Area was served by one very large electricity supply undertaking. Because the Area comprises the whole of Northumberland and Durham and the northern portion of Yorkshire, it must be roughly the same area as that which constituted the old Kingdom of Northumbria, which was famous for its culture at one period. Bamburgh, the "Joyous Gard" of Launcelot, on the coast about 15 miles south of Berwick-upon-Tweed, was established by King Ida in 547 and remained the seat of the Government of Northumbria for 250 years. Edward II sought sanctuary there after Bannockburn. Just off this coast is Lindisfarne or Holy Island, which was the refuge of St. Cuthbert and therefore the centre or source of Christian learning of the old Kingdom of Northumbria. The especially beautiful "Lindisfarne Gospels," made by the monks, are now in the British Museum.

Durham Cathedral, which has passed on through the centuries such a wealth of culture from St. Cuthbert, stands with the castle, which houses such wonderful

Our photo above shows Dunston "B," the largest station in the Area: effective capacity 184 MW


Trading Estates
Steel Works
Shipping
Chemicals
Heavy Engineering
Power Station Generating Plant
Satellite Town
Coal Fields
Iron Ore Area
TO GALASHIELS
AREA SUPPLIED BY S.E. SCOTLAND
SE SCOTLAND
SW SCOTLAND
NORTHUMBERLAND
DURHAM
TYNE
WEAR
TEES
WOOLER
ALMOUTH
AMBLE
BELLINGHAM
GREENHEAD
CARVILLE
CLOSE
DUNSTON
SOUTH SHIELDS
SUNDERLAND
BLAYDON
HARTLEPOOL



This electrical assessment map of the North Eastern Area, which has been specially prepared by the *Electrical Review*, also shows how the population clusters along the main rivers and over the coalfield, dense urban areas in white, urban in blue, rural in red and sparse rural in grey

tapestries, dominating the city and the environs, and presents that mystifying mixture to the uninitiated eye which inspired Scott to pen his verse "Half church of God, Half castle 'gainst the Scot." And further to enrich this great monument of learning is Durham University, one of the constituent colleges of which is housed in part of the castle. Farther south there is Whitby, the famous Abbey which was the home of the cowherd poet Caedmon.

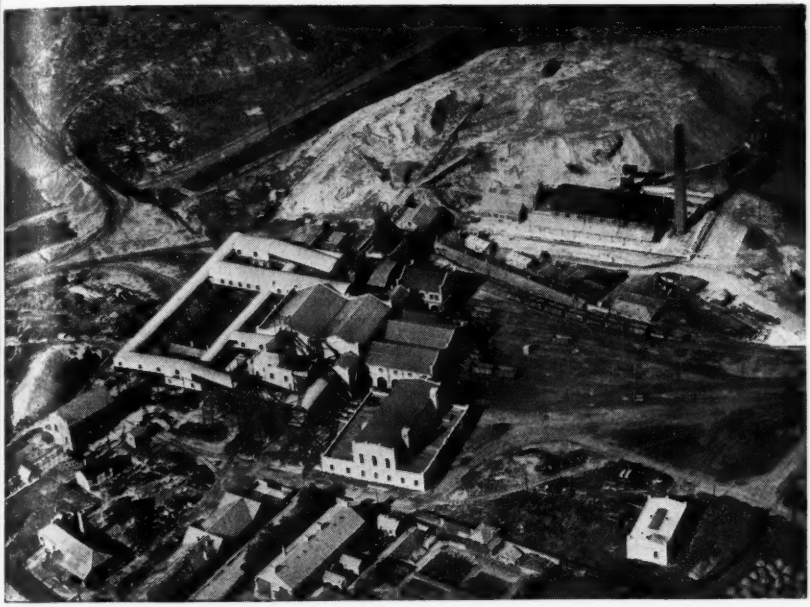
These are some of the indications that the North Eastern Area, whose basic industries contribute so much to modern trade and commerce, has a great cultural background and a rich historical one, too.

Newcastle, the largest and most densely populated city in the Area, and the headquarters city of the North Eastern Electricity Board and the North Eastern Division, has more of its ancient walls remaining than has any other city in England, except Chester, Chichester, Southampton and York. This is surprising, because of the city's historic sieges which many believe gave it its motto *Fortiter Defendit Triumphans.*

From another Tyneside town, Wallsend, starts the Roman Wall which was built right across the country to Bowness-on-Solway in the west as protection against raiding parties from the north, passing, 26 miles to the west, Sewingshields, where King Arthur and his Knights "still sleep." Also on the Tyne is Corbridge from which it is still possible to trace a part of Watling Street to the north and over the Border. Finally, we may mention Otterburn, 12 or so miles from the Cheviots, the scene of the battle between Percy and Douglas, and Farne Islands, where Grace Darling once lived.

Excluding the rectangular-like 150 square miles or so of land, with the Cheviots, the Tweed and the coast line as three sides of the rectangle, which is operated by the South East Scotland Electricity Board by arrangement with the North Eastern Electricity Board, the North Eastern Area has about 5,683 square miles of land. As we have already indicated, it covers the whole of Northumberland and Durham counties, the whole of the North Riding of Yorkshire and small northern parts of the East and West Ridings. The northern boundary of the area is the English-Scottish Border, or the line of the Cheviots and the Tweed. The eastern boundary is the North East Coast of England, from the Border in the north to Filey in the south, a distance of about 130 miles. The Area boundary in the west constitutes the

York, where the Minster draws visitors from the world over, is depicted with a "dense urban" core



Seghill Colliery has the lowest electricity consumption per ton produced ; associated brickworks at rear

western boundaries of Northumberland and Durham and the northernmost part of the west boundary of Yorkshire to a point just south of Wild Boar Fell, or to a point where the Rivers Eden, running north, Ure, running east, and Lune, running west (at first), almost meet ; *i.e.*, the western boundary of the Area follows the northernmost part of the Pennine Chain.

The south west and south east boundary points of the North Eastern Area are actually the west and east extremities of the south boundaries of the North Riding of Yorkshire, but the central and southerly bulge of the south boundary of the Area is such as to absorb comparatively small parts of the West and East Ridings, the boundary just taking in on the south the town of Harrogate and the city of York—in fact it almost follows the southernmost boundaries of the supply undertakings associated with these large centres in the south of the Area.

At the extreme north of the Area is a stretch of land from the western boundary of the Area to the North East Coast at about five miles north of Amble, which roughly averages about 15 miles wide and has an area of approximately 750 square miles.

According to the Ordnance Survey map "Electricity Statutory Supply Areas 1946," this stretch of land constitutes by far the largest area in the country for which there were no statutory undertakers. This sort of no man's land, which is almost entirely in the "virtually uninhabited" class of population density, where the farms with the "fortified look" are particularly in evidence, and where the sheep are extremely hardy, makes the arrangement to which we have referred between the two Area Boards an obvious one.

To define the Area in terms of the former supply undertaking areas, it is probably simplest to refer to the non-North Eastern Company "pockets." Following the coast from north to south these are: Amble U.D.C., Tynemouth Corporation, South Shields Corporation, Sunderland Corporation, Seaham U.D.C., West Hartlepool Corporation, Redcar Corporation, Skelton and Brotton U.D.C., Whit-

Durham Castle and Cathedral form one of the most picturesque and historic groups in the North Eastern Area

by U.D.C. and Scarborough Corporation. Hugging the south boundary we have the former undertaking areas of the York and Harrogate Corporations. Inland there are the former undertaking areas of the Newcastle & District Electric Lighting Co., Ltd., Newcastle Corporation, Stanley U.D.C., Crook and Willington U.D.C., Hawes and Gayle Electric Lighting Co., Ltd., Askrigg & Reeth Electricity Supply Co., Ltd., Richmond Corporation, Darlington Corporation, Stockton-on-Tees Corporation, Middlesbrough Corporation, Eston U.D.C., and Guisborough U.D.C.

Among the outstanding physical features of the North Eastern Area are the three rivers Tyne, Wear and Tees, which carry, respectively, the three greatest industrial centres in the Area, namely, Newcastle, Sunderland and Middlesbrough. All these rivers have their sources in the Pennines, and we shall see how they exert the greatest possible influence industrially and electrically on the Area.

Excluding the Yorkshire part of the North Eastern Area we can roughly divide the remainder into three main strips of land all running north and south. In the west there is a moorland strip where the population density overall is only about three or four persons per square mile. The outstanding exceptions here are the valleys of the Tyne, Wear and Tees running roughly west to east. The central north to south strip is mainly rural area with a population density of about 116 persons per square mile. Finally, the third strip on the east is largely an industrial area in which the population density averages about 1,880 persons per square mile. In the south there is a great area of the Yorkshire moors in the east and a continuation of the central rural strip which spreads both east and west in the extreme south to the outskirts of York and Harrogate.

This strip idea is expressed throughout the Ordnance Survey. For instance, the "Land Classification" map shows the west strip as moorland, the central strip as crops and grass, and the east strip as coalfields, crops and grass. Similarly the markings on the "Land Utilization" map are west, pasture; central, meadowland; and east, arable and meadowland. The "Types of Farming" map shows land of small agricultural value in the west, rearing pasture land in the centre, and arable grass land and mixed farming in the east.

Two extreme contrasts afforded by the foregoing Area definition are that as much as a quarter of the total area is

very sparsely populated moorland, while about 10 per cent is devoted intensively to heavy industry. The greater part of the industrial area is in one stretch extending along the coast line from about Amble in the north to Saltburn in the south. It also extends westwards very irregularly, but in the central portion to a distance averaging about 40 miles. It embraces such important centres as Newcastle and the Tyneside towns, Sunderland, which claims to be the largest shipbuilding town in the world in respect of the industry actually within its boundaries, Hartlepool, Middlesbrough, Gateshead, Darlington and Stockton.

This major industrial area of about 700 to 800 square miles is essentially the North Eastern coalfield, and it represents a vast concentration of active pits. A chain of smaller coalfields, largely undeveloped, straggle from Berwick southwards down the coast and then inland to the west, just north of Hexham. There is an iron-ore field south of Middlesbrough and a number of lead, fluorspar and barytes mines are being either reopened or considerably extended in the moorland areas around the head of the Wear and Tees valleys. The three rivers represent major shipbuilding centres, all having fine harbours, docks and shipbuilding yards. And then there is the great iron-smelting and steel-making centre at and around Middlesbrough, and a smaller one at Consett.

On the Ordnance Survey "Population Density" map there is, corresponding to the major industrial area, a large patch of "suburban and industrialized rural" shading (400 to 6,400 persons per sq mile), with sizeable "urban" (6,400 to 25,000 per sq mile) markings at and around Middlesbrough, Stockton, Darlington, Durham, Consett, Seaham and Morpeth. In Newcastle and the Tyneside towns we have the highest grading "Dense Urban" (over 25,000 per sq mile), as is also the case in lesser degrees at Sunderland and Hartlepool. In most instances these high gradings are skirted by the next lower grading. In the extreme south, Scarborough, of East Coast holiday fame, York, where the Minster continually draws visitors from the world over, and Harrogate, where the custom of "taking the waters" seems no longer to be confined to the wealthy, are

Panoramic view of the populous and busy city of Newcastle, one of the Area's greatest industrial centres

all depicted with "dense urban" cores.

The foregoing is the rich and diverse background to our electrical assessment of the North Eastern Area in which the former electricity supply undertakings already mentioned built up the public electricity supply to the point at which it was taken over last year by the North Eastern Electricity Board and the North Eastern Division of the British Electricity Authority. Both of these organizations have their headquarters in the same building, i.e., Carliol House, Newcastle, previously the headquarters of the former North Eastern Electric Supply Co., Ltd. This is the only one of the fourteen areas where the headquarters of both organizations are housed in one building, and this, of course, is the direct outcome of the new Area being previously almost wholly in the hands of one undertaking.

The Board chairman, Mr. H. H. Mullens, and the deputy chairman, Mr. T. E. Daniel, work with their principal officers as an executive team (shown in the accompanying group photograph), the principal officers being Mr. T. M. Ayres, chief engineer; Mr. W. A. Royle, chief commercial officer; Mr. A. H. Kenyon, sub-area liaison officer; Mr. J. E. Hayes, secretary; Mr. E. J. Corbett, chief accountant; and Mr. H. Haigh, purchasing officer. It is still too early for a hard-and-fast permanent organization to have been built up—indeed, in the interests of progress such a result is never likely to be brought about—but the accompanying organization tree indicates the main pillars of the structure by which the executive team are tackling their task. The tree should be studied in conjunction with the accompanying special map, and we should add that while the district organization has not yet been finally decided upon, some of the ex-municipal and smaller ex-company undertakings have been welded, with former Nesco districts, all as new districts, into the organization.

With obviously necessary modifications the foregoing notes and the appropriate organization tree and executive team photograph all apply equally to the North Eastern Division. The divisional controller, Mr. J. C. Mitchell, leads the following members of the Divisional executive team: Mr. J. B. Jackson, chief generation engineer (operation); Mr. H. G. B. Mahon, generation engineer (construction); Mr. A. W. Mitchell, system operation engineer; Mr. W. Skipsey, transmission engineer; Mr. F. H. Birch, technical engineer; Mr. P. G. Lloyd, steam test engineer; Mr. W. M. Tulip, divisional secretary; Mr. A. L. McDonald, divisional accountant; and Mr. J. H. Butler, statistical officer. Our purpose in this instance, however, is to portray the electrical picture as it was on, or as near as possible to, vesting day, so it is not proposed to delve too deeply into the new organizations as such.

The Division last year became responsible for 21 generating stations in the Area, with a total effective capacity of 600.4 MW, and a part of the national (grid) transmission system which embraced nine major transformer substations with a total transformer capacity of 468,500 kVA and three major switching stations.

The accompanying schedule of the power stations operated by the Division has been specially designed and prepared for ready survey purposes, but a few comments will give it a fuller meaning. It will be seen that two of the stations, although operated by the Division, are not B.E.A. stations, but their combined effective capacity is only 9 MW.

The Division's largest station is Dunston "B," with an effective capacity of 184 MW, while a fair second place

North Eastern Board Executive team
Front row, left to right:—Messrs. T. E. Daniel, H. H. Mullens, and T. M. Ayres. Back row:—Messrs. E. J. Corbett, J. E. Hayes. A. H. Kenyon, and W. A. Royle

The Controller and principal executive officers of the North Eastern Division

Front row :—Messrs. J. H. Butler, A. L. MacDonald, W. M. Tulip, J. C. Mitchell, J. B. Jackson, H. G. B. Mahon and P. G. Lloyd. Back row :—Messrs. A. W. Mitchell, W. Skipsey, E. Forth, P. Morrell, F. H. Birch, and F. L. Scarth

goes to North Tees, which has an effective capacity of 105 MW. The next largest station, Carville (58 MW), is, however, a poor third (although Sunderland is third in actual plant capacity); indeed, the combined effective capacities of the first

Station	Previous Ownership	Type of Station	Installed Capacity MW	Effective Capacity MW. s.o.	Shift Operation	kWh. Generated Millions 1948/49	Net Import or Net Export
							Million kWh
Askrigg*	Askrigg & Reeth Elec. Supply Co. Ltd.	Oil and water	0.053	—	—	.07	—
Ayresome ...	North Eastern Elec. Supply Co. Ltd.	Steam (waste heat)	3.0	3.0	3	11.38	—
Blaydon	North Eastern Elec. Supply Co. Ltd.	Gas ...	1.12	1.0	3	5.09	—
Carville	North Eastern Elec. Supply Co. Ltd.	Gas ..	62.5	58.0	3	221.52	133.96 Imp.
Close . ..	Newcastle & District Elec. Lighting Co. Ltd.	Steam ..	13.5	10.0	2	25.34	31.64 Imp.
Darlington 'A' ..	Darlington Corp.	Steam ...	12.4	6.0	1	20.72	—
Darlington 'B' ..	Darlington Corp.	Steam ...	60.0	57.0	3	323.12	225.93 Exp.
Dunston 'A' ..	North Eastern Elec. Supply Co. Ltd.	Steam ...	45.0	42.0	2	112.00	—
Dunston 'B' ..	North Eastern Elec. Supply Co. Ltd.	Steam ...	202.5	184.0	3	1,135.11	41.39 Imp.
Harrogate ..	Harrogate Corp.	Steam ...	15.87	8.0	2	11.58	51.13 Imp.
Hawes*	Hawes Elec. Lighting Co. Ltd.	Oil	0.056	—	—	.05	—
Horden 'B' ..	North Eastern Elec. Supply Co. Ltd.	Gas ...	6.0	6.0	3	37.12	—
Middlesbrough ..	Middlesbrough Corp. ...	Steam & Gas	2.5	2.0	1	.54	—
North Tees ..	North Eastern Elec. Supply Co. Ltd.	Steam ...	110.0	105.0	3	541.09	177.90 Imp.
Scarborough ..	Scarborough Corp. ...	Steam ...	9.37	7.0	2	7.85	38.77 Imp.
South Shields ...	South Shields Corp ...	Steam ...	10.5	10.0	2	16.58	21.55 Imp.
Sunderland ..	Sunderland Corp.	Steam ...	60.0	49.0	3	159.73	24.48 Exp.
York (Foss Islands)	York Corporation	Steam ...	35.5	34.0	3	70.96	71.03 Imp.
York (Linton) ...	York Corporation	Water Power	0.75	1.0	3	2.00	—
		Total ...	650.525	583.0		2,701.85	316.96 Imp.
Redcar†	Dorman, Long & Co. Ltd., operated by N.E.S. Co.	Steam (waste heat)	4.75	4.0	3	20.54	—
Warrenby† ...	Dorman, Long & Co., Ltd., operated by N.E.S. Co	Steam (waste heat)	5.206	5.0	3	29.77	—
		Total ...	660.481	592.0		2,752.16	316.96 Imp.

* These stations are now closed down and the network is fed by the Area Board; not included in totals.
† These two stations are owned by Dorman, Long and Co., Ltd., and operated by the Division.

and second largest stations (289 MW) is only a trifle below half the combined effective capacities (291.5 MW) of all the B.E.A.-owned stations in the Area. Only three of the stations are below one megawatt, however, and two of these are of less than 60 kW capacity.

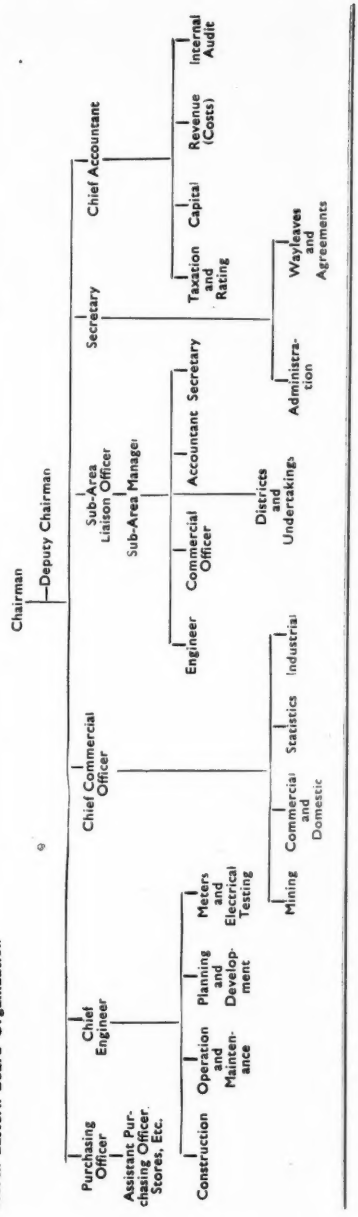
The only new station under construction at present in the Division is North Tees, which will have an ultimate capacity of 240 MW and is likely to be put into commission in 1951 with an initial capacity of 60 MW. A 100 MW major extension is now well advanced in construction at Dunston "B," while the particular interest in a 15 MW extension which is now going ahead at Dunston "A" is that the prime mover is a gas turbine—Parsons, open cycle.

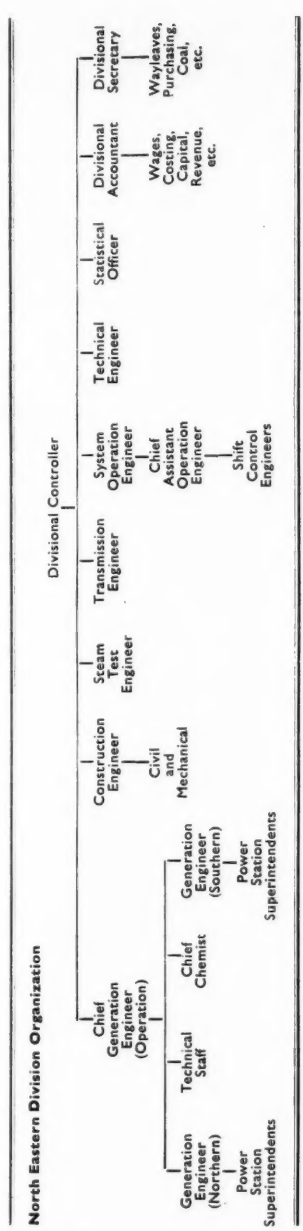
The major sub-stations and their capacities are: Dunston, 180,000 kVA; Darlington, 66,000 kVA; North Tees, 60,000 kVA; Osbaldwick, 45,000 kVA; Close, 30,000 kVA; Scarborough, 28,000 kVA; South Shields, 20,000 kVA; Sunderland, 20,000 kVA; Malton, 9,000 kVA; Northallerton, 6,000 kVA; Whitby, 4,000 kVA; and Norton, Harton and Hebburn, 132 kV, 66 kV and 66 kV switching stations, respectively.

In an area so greatly dominated and for so long by the great basic industries the modern load-building approach of

The distribution of the load is indicated by this map showing the substations in the Area

North Eastern Board Organization





what comes first, electricity supply or the consumer, is not always a success, to say the least. With the acquisition of the 25 undertakings already named the North-Eastern Board assumed the responsibility of distribution and selling to 702,100 consumers to whom was sold 2,597 million kWh and who created a m.d. of some 600 MW, all these figures being for the year ended 31st March, 1949. The consumers range from a large chemical plant with an annual consumption of about 100 million kWh, down to a vast number of small domestic consumers with moderate consumptions. Some typical large single consumers with their demand and consumption figures are given below:—

Consumer	Demand kW.	Consumption million kW. per year
Shipyard	2,000	4.5
Marine Engineering Works	700	2.0
Large Electrical Engineering Works	2,300	10.0
Medium (Mining) Engineering Works	400	1.2
Medium Engineering Works	550	2.0
Light Engineering Works	135	0.35
Chemical Plant	2,200	13.0
Flour Mill	1,700	8.2
Large Steel Foundry ...	4,000	7.5
Glass Works	200	0.95
Steel Works and Rolling Mills	9,000	54.0

Before attempting to portray by figures the load picture which the consumers represent, we draw attention to the fact that there are three distinct concentrations, namely, at and along the eastern lengths of the Tyne, Wear and the Tees. The first-named concentration is by far the greatest. The Tees takes second place.

In the case of the Wear, although the concentration is not so dense it extends north and south over a much wider area.

Location	Area sq. miles	Estd. Population	Est. Occupied Dwellings	No. of Consumers	Million kWh Sold
Tyne Sub-Area	2,066	993,845	273,000	215,000	823
Wear Sub-Area	560	857,188	230,000	195,000	851
Tees Sub-Area	912	657,743	179,000	175,000	662
York Sub-Area	1,090	264,634	79,000	76,500	174
Harrogate Sub-Area	1,055	151,751	68,000	40,600	87
Area Board	5,683	2,925,161	829,000	702,100	2,597

i.e., the great industrial stretch of the North-Eastern Area.

The load position on a locational consumption basis is shown by the table on the preceding page, made up in Sub-Area form for convenience.

Now let us bring our load analysis to closer detail, in terms of classes of load, and, again based on 1948-49 consumption figures, we have in millions of kWh:—

Class of Load	Million kWh
Industrial	1,756
Domestic	531
Shops and other premises	181
Traction	101
Farms	13
Public lighting	11
Bulk to Yorkshire Area Board	4
Total	2,597

The items of major interest in the above table are industrial, which represents about 68 per cent of the total sales, and domestic with a consumption of only about 20 per cent. It behoves us then to analyse the industrial load, which we do very roughly in the table below in terms of consumption and percentages of the total 1948-49 consumption.

Industry	Consumption Million kWh	Percentage Total Sales
Collieries	711	28
Iron and Steel	293	11
General Manufacturing ...	288	11
Chemical	154	6
General Engineering	88	3
Shipbuilding	108	4
Miscellaneous	114	5
Total	1,756	68

The striking figure of 28 per cent of the total sales to one industry calls for further comment on the colliery load. Very nearly all the N.C.B. collieries in the Area are connected either directly or indirectly to the Board's system which supplies about 85 per cent of all the electrical energy they consume. The N.C.B. has 187 collieries in the Board's Area, of which 113 are completely electrified and take all their power requirements from the Board's system. Well over one-third of the coal output in Northumberland and Durham is produced by these completely electrified collieries, which consume an average of 22 kWh per ton of coal produced. A close estimate of the load carried by the remaining steam-driven plant indicates that if all the collieries in Northumberland and Durham were completely electrified their consumption per ton raised would be 28 kWh.

The following are the showrooms or service centres throughout the Area:—

TYNE SUB-AREA.—Alnwick, Amble, Ashington, Bedlington, Blyth, Gateshead, Hexham, Morpeth, Newcastle-upon-Tyne, North Shields, Stocksfield, Wallsend and Whitley Bay.

WEAR SUB-AREA.—Chester-le-Street, Consett, Crook, Durham, East Boldon, Fulwell, Houghton-le-Spring, Seaham, South Shields, Spennymoor and Sunderland.

TEES SUB-AREA.—Barnard Castle, Billingham, Bishop Auckland, Darlington, Easton, Guisborough, Loftus, Middlesbrough, Redcar, Saltburn-by-the-Sea, Shildon, Skelton-in-Cleveland, Stockton-on-Tees, Stokesley and West Hartlepool.

HARROGATE SUB-AREA.—Bedale, Harrogate, Knaresborough, Northallerton, Ripon and Richmond.

YORK SUB-AREA.—Filey, Malton, Scarborough, Whitby and York.

As might be expected in an Area previously served mainly by one undertaking, with few exceptions there were no wide variations in tariff levels on vesting day. Since then the opportunity has been taken, while raising the lowest domestic rate to 0.75d per kWh, to adjust the more serious anomalies and in general the lighting rate is now 3.5d per kWh in the largest towns, 4d to 4.5d per kWh in the industrial districts, and 5.5d per kWh in the outlying rural districts.

As to the immediate future, there will continue to be evolutionary growth in the supplies to the basic industries all the time general national production remains high, but new loads are being developed as the result of the introduction of light industry into this essentially heavy industry area, with the object of absorbing the large surplus of female labour resulting from the preponderance of heavy industry and mining which absorb male labour only. The trading estates are doing much to bring the light industry into the Area.

We are indebted to Mr. Mullens and Mr. Mitchell, and to their principal officers, for co-operation in this survey.

Industry and the House

Last Days of the 1949 Session

By F. J. ERROLL, M.A., A.M.I.E.E., M.P.

MR. HERBERT MORRISON announced to the House on Thursday, the 8th, that the present session would come to an end on Friday, 16th December. At the same time he stated that a new session would begin on 24th January, thus "officially" disposing of those persistent rumours which have been predicting a general election early in the New Year. The Government is determined to give no inkling of the proposed date and so will keep the Opposition guessing up to the last minute. This is a legitimate Parliamentary practice and has been adopted by other Governments of different political complexions in the past.

At the same time the Government has been making sure that there shall be no legislation outstanding from its election programme when Parliament is prorogued before Christmas. The Government will be free to do what it chooses in the New Year. In consequence, therefore, Parliamentary business is of a varied and scrappy nature as the last of the small Bills are pushed through, together with miscellaneous Orders and other minutiæ.

Debates on National Boards

One outstanding feature of these last weeks has been the series of debates on the reports of nationalized industries. First the Coal Board, then the groundnuts scheme, and now a one-day debate on the British Transport Commission. This debate was overshadowed by the previous announcement of Mr. Barnes, Minister of Transport, that freight charges on the railways would probably be raised by 16⅔ per cent. Some members suggested a State subsidy as an alternative, and more than one Socialist M.P. was alarmed at the increase in the number of "C" licences which, it is alleged, threaten the chances of the Commission offering a fully integrated service to the public. After the Front Bench speakers had finished there was only three hours of Parliamentary time for the back-bench speeches, and members on both sides of the House felt that this was far from enough time in which to discuss the many aspects of the vast nationalized transport system of this country. One member, who failed to get into the debate, tried to continue the subject during an adjournment debate in the course of the following week, but he was ruled out of order by the Chair.

Parliamentary questions showed members interested as usual in a wide variety of topics relating to electrical matters. There was Mr. Skinnard asking the Secretary of State for the Colonies about plans for the training of African artisans for the Uganda Electricity Board (he will receive a letter when the Governor of that Territory has replied); there was yet another question about the poor lighting in the Palace of Westminster, to which Mr. Key, the Minister of Works, gave the usual reply about waiting for a new a.c. supply; and there was Sir Arnold Gridley asking the Minister of Fuel and Power about Bankside power station, as was reported in the *Electrical Review* last week.

Fears that flame-proof electrical equipment for the new oil refinery programme imported from America under Marshall Aid might be of a lower standard than that required of similar British equipment were set at rest by the Minister of Labour. He stated that no relaxations would be permitted whatever the source of origin of the equipment.

Metal Finishing

A COURSE of eight lectures on "Modern Developments in Metal Finishing" will be delivered at the Northampton Polytechnic, St. John Street, London, E.C.1, on Wednesday evenings, commencing on 11th January next. The fee for the course is 15s, and particulars can be obtained from the Department of Applied Chemistry at the Polytechnic.

Power Station Strike

Effects Upon London's Electricity Supply

ON Monday last workers at the Brimsdown, Littlebrook and Taylor's Lane (Willesden) stations ceased work without due notice and without the approval of their unions as a protest against the merging of special payments formerly made at those stations in the increase of 1½d an hour made to all power station workers in May last. They claimed that this "heat and dirt money" should continue to be paid over and above the general increase.

The matter had been under discussion for some time and it had been arranged that the District and National Joint Councils should decide where the continuation of extra payment was justified. The British Electricity Authority, announcing this, contended that no man would suffer any pecuniary loss and that conditions at the stations did not now justify the excess payments.

E.T.U. President's Statement

Mr. F. Foulkes, president of the Electrical Trades Union, also drew attention to the existence of the negotiating machinery and said that the strike was to be regretted.

He stated that a special meeting of the Negotiating Committee had been held on 6th December when the trade unions were unable to substantiate the case for the continuance of "plus" payments in their old form, but stress was laid on the provision in the agreement relating to abnormal conditions and the Works Committees were advised to negotiate on this basis. He understood that certain discussions had taken place at works level. A meeting had been arranged for 15th December at which the largest possible representation from the men involved would have been able to meet their national leaders. A full report was to have been given of the negotiations to date and details of how it would be possible under the conditions now prevailing in the power stations where they worked to make a successful claim for extra payments.

Service Men Sent In

Prompt action was taken by the Government and men from the Services were sent to the stations to keep the plant running with the aid of the technical staff.

This employment of Service men led to trouble at Barking and the manual workers there decided to strike on Tuesday afternoon in protest.

In the House of Commons on Tuesday the Minister of Labour and National Service (Mr. G. Isaacs) said that the Government was taking all necessary steps to maintain supplies but some load shedding was inevitable. The men's action was not only endangering the interests of the country but was a breach of contract with their employers and of loyalty to their union leaders. He reiterated that no man would suffer any monetary loss. Their duty was to return to work at once and leave it to the joint negotiating machinery of the industry to deal with any point requiring settlement.

Answering a question by a Labour member, Mr. Isaacs said that there would be no negotiations by the Government with anybody but the recognized trade unions.

On Tuesday and Wednesday (when we went to press) there were cuts in supply, particularly in the London area. The British Electricity Authority said that although at one time the load shedding amounted to 20 or 25 per cent it had gradually been reduced to about 10 per cent. On Wednesday morning a national cut amounted to about 5 per cent of the total. Trolley-bus and Underground Railway services were restricted to some extent.

The British Electricity Authority stated that it was hoped to attain 80 per cent of the output of the stations affected with the help of the Servicemen who had been sent to them.

Action at Other Stations

It was announced from the Battersea and Tir John (Swansea) power stations that the workers there had decided to ballot upon the question of action in support of the strikers.

Representatives of 24 stations were present at a meeting on Tuesday evening of the London Combined Workers' Committee. A statement was issued deprecating the present slow working of the negotiating machinery and contending that all existing bonuses and local agreements should remain in operation. The withdrawal of Servicemen was demanded and it was said that all undertakings would consider what action to take to support the stations on strike.

A decision to continue the strike was taken by the Barking men on Wednesday but the position was to be considered again at a meeting to be held yesterday (Thursday).

Wind Power Research

Further Progress of the E.R.A. Investigations

As was foreshadowed in the account of a study of the potentialities of wind power for the generation of electricity on a small scale (*Electrical Review*, 26th August, 1949), the first of a new series of reports* on the subject is now available. It has been issued at an early stage with the double object of clarifying procedure and making known the information so far gained about power generation on a large scale by the winds.

The first part of this factual document is a costing study, a precautionary safeguard, to which too much significance should not be attached. Eventual costs based on actual design may well be less than those estimated.

There follows an account of wind velocity surveys on the Orkney mainland hills (nine sites), which appear to be exceptionally well situated, decided upon in June, 1948. Equipment had to be devised, developed, assembled and transported in two months. Two anemometers of a special type, integrating available wind energy directly in kWh/sq in, were lent to the E.R.A. by the research section of Electricité de France.

Contract Placed for Generator

The preliminary results caused the North of Scotland Hydro-Electric Board to start negotiations for the construction of a 100 kW wind-driven generator (a contract has since been placed), probably to be erected on a 75ft tower on Costa Head.

Similar surveys started in March, 1949, in North Wales at three places on the Lleyn Peninsula in Caernarvonshire on a site above Dolgarrog and on Holyhead Mountain in Anglesey. Tests were begun in May at seven places in Cornwall and others are to commence soon in South Wales near to Haverfordwest and on the Gower Peninsula.

In addition to information obtained from abroad to which the report briefly refers, well over one hundred suggested designs and offers of assistance in various forms from individuals and organizations in Britain are being carefully considered.

Conclusions drawn after some eighteen months' close application to the subject, from the evidence provided by the investigations described in this report, are that it is possible to find within easy reach of electricity distribution lines sites where wind regimes are favourable enough for an annual output of about 4,000 kWh/kW installed to be expected from generators of economic design. The optimum size (not yet conclusive) of conventional propeller type machine may be between 1,000 and 2,000 kW. The constructional cost of a conventional airscrew unit of this size may be about £50/kW in the post-development stage.

Probable Cost of Energy

Without assuming any "firm kW" value and regarding wind-driven sets solely as fuel savers, generation by this means may not cost more than 0.25d/kWh at good sites. Therefore, a price of 0.4d/kWh for energy sold in fairly remote districts (a few years hence when wind generation may be available) should render the use of both good and fairly good sites economic.

It is very probable, the report states, that a large number of sites of these two classes exist in coastal districts, where annual outputs of from 3,000 to 4,000 kWh/kW installed could be obtained at 30 m.p.h. wind speed rating.

According to the report, it is not unreasonable to assume that several hundred sites could be found, each to accommodate 2,000 kW of plant furnishing 4,000 kWh/kW and several hundred more to provide 3,500 kWh/kW yearly. The total capacity may thus be between one and two million kW, producing from 3,750 million to 7,500 million kWh/year

* Ref.: C/T.101, British Electrical and Allied Industries Research Association, Thorncroft Manor, Dorking Road, Leatherhead, Surrey, price 1s. 6d.

with a corresponding saving of from two to four million tons of coal.

Wind power must clearly, says the report, be regarded primarily as a fuel saver. Nevertheless, diversity in its occurrence at different places, or its combination with hydro-electric schemes under certain conditions, may enable wind power to contribute some "firm" power. In general, its value when fed into a network will be the incremental cost of the fuel-generated energy which it can displace.

Amenity and utility values of electricity are high on islands round the coasts of Britain, and in many other isolated parts of the world. There is a strong case for the combination of wind power with diesel-driven generators in such places, where the cost of fuel oil may be 0.65d/kWh or more.

It is not without importance that the development of wind power for electricity generation in Britain may lead to the establishment of a new industry with good export prospects.

Technical Personnel

ELECTRICAL ENGINEERING REQUIREMENTS

THE Ministry of Labour and National Service has issued the first five of a series of twelve reports dealing with the supply of workers with professional or equivalent qualifications in science, engineering, architecture and surveying. These reports have been prepared after detailed inquiries by specially appointed committees, which have been, in form, sub-committees of the Technical Personnel Committee presided over by Lord Hankey.

The report dealing with electrical engineering, which has been prepared under the chairmanship of Sir Arthur P. M. Fleming, is particularly interesting, and there is no doubt that its findings will be of great value to universities, technical colleges, employers and parents. It starts by quoting the definition of a professional electrical engineer after which it is shown how the annual demand for 1,670 professionally qualified electrical engineers is divided under the headings of public service, industry and research, teaching, consultants, etc.

The requirements for workers in the above spheres of activity are then treated separately and it is estimated that the annual supply of qualified men up to 1950 will be 1,550. This indicates a deficiency of about 150 but it is possible that this will be met in part, if not wholly, by an increase in output from universities and technical colleges.

Although the present demand exceeds the supply it is thought that this state of affairs will be remedied during the next five years. Employers could assist by avoiding any tendency to demand qualifications beyond those actually necessary. So long as steps in hand or planned are brought to fruition no other action is recommended but it is felt that facilities for further education of technicians at technical colleges need to be improved.

It is also recommended that the attention of industry should be drawn to the need for amplifying existing graduate apprenticeship training facilities with a view to encouraging additional firms, or groups of firms, to adopt schemes similar to those already in operation in the larger organizations.

Copies of the report are obtainable from H.M. Stationery Office, price 7d post free.

Industrial Gas Turbines

AT the November sessional meeting of the Coventry Electric Club a lecture on "Industrial Gas Turbines" was delivered by Mr. C. L. G. Worn (B.T.H. Co.) who explained the simple open cycle type. Means of raising the cycle efficiency were discussed and the effects of turbine inlet temperature, heat exchanging, intercooling and reheating on efficiency and specific output were illustrated by reference to typical plants.

A suitable arrangement of the gas turbine for installation in a locomotive was shown, and the performance was compared with the corresponding steam and diesel electric types. It was pointed out that the application would only become an economical proposition in oil-producing countries. Further applications of the gas turbine for standby and peak-load power plants were also illustrated and the lecture concluded with a description of a marine plant now under construction by the B.T.H. Co., at Rugby.

In the discussion which followed one speaker pointed out that the Brown Boveri Co. in Switzerland had eleven gas turbine machines under construction in 1946 including 10,000, 13,000, and 27,000 kW sets. This speaker stated that the 13,000 kW set had been built, erected and put into commission all within twelve months.

Machine Tool Control Gear

Comparison of Systems

At a well-attended meeting of the Utilization Section of the I.E.E. in London last week Mr. A. R. H. Thorne (Brookhirst Switchgear, Ltd.), read a paper dealing with some of the technical considerations involved in the development and design of electrical control gear for machine tools.

After referring to the modern practice of applying individual drives to machines, as opposed to the overhead shafting and belt drives of twenty years ago, the author compared the control facilities offered by the former with other orthodox systems, outlining the advantages and disadvantages of each. He then discussed the choice of electrical control gear in some detail, making particular reference to the requirements of apparatus for frequent duty.

The design of components, particularly contactors, was given due consideration and Mr. Thorne showed how design might be based on the results obtained from experimental work and past experience. After brief particulars of some complex schemes of control the need for incorporating reliable interlocks was stressed, especially electrical interlocks involving auxiliary switches. The importance of supply voltage was then indicated and low voltage control circuits were compared with those operating at line voltage.

Speed Control Methods

Speed control was next treated, the various schemes and circuits being described and special reference being made to the application of electronic equipment. The importance of motor protection was then stressed, it being felt that the ideal overload protecting device should possess thermal characteristics identical with those of the motor. Electric braking methods were dealt with in some detail after which timing devices were described and the electrical timer compared with mechanical and thermal types. The advantages of d.c. supply over a.c. were then described in connection with motor speed control and in conclusion Mr. Thorne reviewed the developments in design and applications of control gear which might take place in the future.

DISCUSSION

Opening the discussion, Mr. J. C. Jones (Churchill Machine Tool Co.) compared electric with hydraulic control and said that where rotary motions were involved electrical means of carrying them out were preferable, but for movements of a reciprocating or oscillatory type there was much to be said for hydraulic movement. Control gear must fulfil mechanical and electrical requirements without unnecessary complication, but any skimping must be avoided. Every industrial contactor, however small, should be suitable for use on 550 V. The most essential need at the moment was for contactors, relays and overloads designed on a unit basis, so that they could be assembled on panels. There was also a need for standardization of ratings and essential overall dimensions.

It would be a mistake to substitute electronic methods for well-established electrical methods. Thyratron variable speed control was more complicated than Ward Leonard control and few people understood it. A more fruitful line of electronic development was for profile copying, etc., but there it was necessary to draw attention to the virtues of hydraulics. Of two copying lathes which he had seen, one, which had an electronic profiling device, cost £2,000; the other, which was hydraulic, cost £750.

Mr. A. N. Irens (Bristol Aeroplane Co.), while admitting the sales appeal of good appearance, said that in many cases this had led manufacturers to embody switch and control gear in the machine tool itself. From a maintenance point of view, separate control boxes were to be preferred and with the control gear there should be a permanent wiring diagram. The isolating switch should be in a prominent position and should cover the whole of the equipment on the machine or associated with it.

Mr. W. Fordham Cooper (Electrical Inspector of Factories) said that there were two reasons for isolation. One was to protect the electrician against shock, and for this reason the cover was sometimes interlocked so that he could not have the cover open with

the power on. There were times, however, when he had to see the apparatus at work, and if interlocking were carried too far it might increase danger rather than safety. The isolating switch should therefore be handy to the operator, so that he could use it when he changed work, and not rely on a push-button or something which might catch in his coat-sleeve. Built-in controls had several disadvantages and if they were essential they ought to be accessible and have separate boxes. With oil-immersed equipment one sometimes found overload coils and even fuses in the space above the oil, or an isolating switch in a chamber communicating with this space. Designers should avoid this.

Mr. C. J. O. Garrard (G.E.C.) emphasized that the practice of building-in control gear gave a great deal of trouble with standardization. The ideal was to have separate panels, and machine tool makers should provide a flat vertical space on every machine on which to mount the control gear which the purchaser preferred.

Robustness of control gear was important, and some allowances should be made for variations in system voltage, either by arranging a relay to trip out if the voltage got below a safe figure or one of the operating contactors to do likewise at a few per cent higher voltage than the rest of the gear.

Advantages of Standard Starters

Mr. H. V. Benns (B.T.H.) said it was better for standard starters to be used and built on to the machine. There were cap-plate-mounted or flange-mounted starters which were intended to fit into a cavity in a casting, or a flange could be fitted to the box of a general purpose starter. This had the advantage that the contactor, overload relay, etc., were still enclosed and protected from dusty and oily conditions. In America, the practice of using standard apparatus built on to the machine had made it possible to use mass-produced apparatus, which was cheap and easily replaced. He agreed with the need for having more apparatus on a unit basis, and said that greater co-operation was necessary between machine tool and control gear designers.

Mr. F. C. Fuke commented on the author's statement that slow break caused less arcing than quick break with a.c. contactors, and said that the pitting of the contacts was due to the bombardment by electrons in the arc stream, the velocity of which was proportional to the field strength and the distance which the electrons travelled. Therefore the break should be kept as short as possible. The arc itself had the reverse effect, and would raise nodules on the contacts.

Mr. A. N. D. Kerr agreed that the use of electronics would necessitate the training of maintenance personnel to a high standard. There would be far wider use of control gear with isolating switches if the price were reduced by greater standardization. There had been introduced this year, by a relatively small maker, a plug-in type of starter which made it possible for that maker to offer an extremely compact control unit with an isolating switch and fuses.

Mr. H. C. Cooper did not see the point in streamlining machine tools. It was easier to carry out maintenance if the starter was not right down on the ground and if mounted higher up it would be free from oil and so on.

The author replied briefly.

Boiler Testing

METHODS of measuring and sampling employed in Admiralty tests of ships' water tube steam boilers are summarized, with comment on probable errors, in a paper presented by Mr. R. L. J. Hayden at the Institute of Marine Engineers in London this week.

Several kinds of thermocouple are described with the aid of sketch illustrations, including a total radiation pyrometer type for flame temperature and an aspirator type for furnace exit gas. Brick face temperature is said to be best measured with Seger cones, but thermocouples can be embedded in the face of the brickwork if it is not likely to exceed 2,000 deg F.

A form of chromel-alumel thermocouple illustrated in the paper has been used with excellent results in pipe lines (feed water and superheated steam) instead of the more usual glass-stem thermometer. The resistance thermometer is probably the most accurate for this purpose, although the need for double connecting leads in order to compensate for their resistance may be a disadvantage.

A disc type thermostat of quick response is described for measuring casing temperature. A modification is attached to the casing by a permanent magnet while the disc is spring pressed into contact.

For determining tube metal temperature, chromel-alumel thermocouples can be welded to thin strips of chromel which are bent round the tube and clamped into contact.

Very small quantities of solids dissolved in moisture in steam may be determined by measuring the electrical conductivity of a condensed sample of the steam, expressed in micromhos or reciprocal megohms. For most boiler waters a solid content of one part per million corresponds to 1.5 to 2 reciprocal megohms. Correction is necessary for the presence of dissolved gases which will cause the conductivity to be several times that due to dissolved solids.

Commerce and Industry

Harwell Cyclotron Trials

Convention Exhibition Arrangements

THE cyclotron particle accelerator at the Atomic Energy Research Establishment, Harwell, successfully passed its first full-load trials during the night of 2nd December. The constructional work on the complex buildings and equipment lasted for just under three years, whereas final adjustments for the start-up were completed in a few weeks. This cyclotron, thought to be the largest in Europe, is at present rated at 160 MeV, but is expected to be increased to more than 180 MeV.

The magnet contains 700 tons of steel, having circular poles of 110in diameter and 12in apart. The windings contain 80 tons of copper and need more than 300 kW for excitation; they are oil cooled. The oscillator which injects the accelerating voltage is capable of a maximum output of 150 kW. Large pumps maintain a high vacuum in the spiral accelerating path, which is of 500 cu ft volume. The main portions of the machine are cooled by the circulation of purified water, the installation being in an underground room 100ft long by 45ft wide and 12ft high with a 6ft thickness of concrete overhead. This cyclotron was designed by the staff at Harwell, who supervised its construction. The magnet, built by C. A. Parsons and Co., Ltd., was the biggest single industrial contribution. Electrical equipment was made by the British Thomson-Houston Co., Ltd., and the General Electric Co., Ltd., and vacuum plant by the Metropolitan-Vickers Electrical Co., Ltd.

Power Convention Exhibition

The British Electrical Development Association is again organizing the exhibition to be held in conjunction with the British Electrical Power Convention at Harrogate (19th to 23rd June, 1950), under the direction of the Exhibition Committee appointed by the Convention Council. Applications for space should be sent to the Association by 11th January.

Cardiff Wholesalers' Showrooms

Curran Industries, Ltd., has recently removed to new premises at Canal Street, off Frederick Street, Cardiff. The new premises have enabled the company to lay out extensive and attractive showrooms for the display of a variety of electrical products. A section of the showrooms is illustrated.

Section of the new showrooms of Curran Industries, Ltd., Cardiff

Waveguide Tubing

The latest technical publication issued by Johnson Matthey & Co., Ltd., 73-83, Hatton Garden, London, E.C.1, is a data sheet describing the properties and availability of precision drawn waveguide tubing. It contains full details of the dimensions and tolerances for rectangular and round guide in a standard range.

Building Licensing

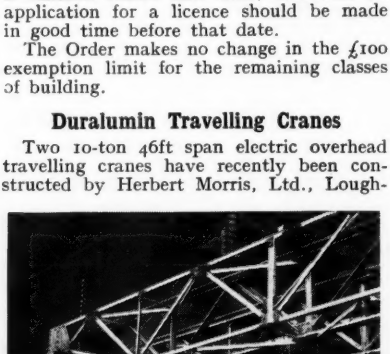
The Minister of Works has made an Order under Defence Regulation 56A reducing from £1,000 to £500 the amount which may

be spent without licence on individual properties in the categories of industrial and agricultural building in the twelve months from 1st, July, 1949, to 30th June, 1950; the corresponding amount for office buildings, storage buildings and educational buildings is reduced from £1,000 to £100. These new limits will take effect from 1st February next, so that work started under the previous limit but costing more than the new limit will not require a licence if it is finished before that date; otherwise an application for a licence should be made in good time before that date.

The Order makes no change in the £100 exemption limit for the remaining classes of building.

Duralumin Travelling Cranes

Two 10-ton 46ft span electric overhead travelling cranes have recently been constructed by Herbert Morris, Ltd., Loughborough, with girders, end carriages and cage structures made of Duralumin S. Each crane structure comprises two lattice girders of Warren braced construction and an outrigged girder, the former intended primarily to carry the crab and hook load and the latter to support platforms, main travel gear, etc. The outrigged girder and all horizontal bracings are in the form of single angles. Crab rails are of steel. Main and outrigged girders are secured by aluminium alloy rivets. The weight of the completed Duralumin girders was only 34 per cent of the estimated weight of a similar set in mild steel. In such circumstances, the weight of the rail structures can also be considerably reduced.



Herbert Morris duralumin travelling crane

South African Import Control

The danger of the South African Government's interfering with the essential services was emphasized by Mr. C. R. Halle, city electrical engineer of Pietermaritzburg, when he referred to import control preventing 37 transformers from being delivered on time and said that Pietermaritzburg would not have sufficient transformers to meet the load. His department had written several times inquiring about an import permit for the transformers, which were ordered in June last year. So far no reply had been received. If they did not get the transformers working by next May, they might have to restrict electricity supplies to new industries. Durban and Port Elizabeth were similarly affected, and were becoming alarmed at the position.

Television Receiver Production

Estimated production of television receivers during November was 35,000, an increase of 8,000 over the October figure which was the previous highest. It is estimated that so far 40,000 sets have been sold by manufacturers to dealers in the Midlands.

New Ediswan Display Piece

A new display production presenting "Royal Ediswan" lamps shows an attractive lady with the slogan "There's Beauty in Good Lighting." This picture has been produced by direct colour photography, reproduced in eleven colours by photo-litho offset as a 24in by 16in display card on 2 lb board, varnished and fitted with invisible hanger. For the publicity programme for 1950 this design will be available for dealers to use illuminated or non-illuminated in their window displays. On some the

Ediswan eleven-colour display card

pictorial portion will be reproduced on transparent material so that illumination from behind will emphasize light and shade and the colour tones. The design will be used in Press advertising launched by a colour insertion in the early 1950 issues of leading publications, and will be applied to other spheres of publicity presentations. It is used in the company's issue of calendars for 1950.

Toughened Glass

A 16 mm film has been made by Pilkington Brothers, Ltd., on the manufacture and uses of "Armourplate" and "Armourlight" glass. This is the third film made by the company, the previous two dealing with sheet glass and polished plate glass. The new film, the premiere of which was held in London last Friday, commences by showing examples of different types of toughened glass, and by a series of tests, the greatly increased resistance to severe impact and thermal shock, in addition to its twisting and bending propensities. It then proceeds to show the wide applications of "Armourplate" and toughened glasses in industry, hospitals, in building, rail and sea transport, and in the home, and its value in clarity of vision.

The film has been produced by Cecil Musk Productions, in association with the Film Producers' Guild. Many of the "shots" are excellent and the commentary is free from undue technical phrases, which enables the sequences to be easily followed. The company has had a number of copies made, and these can be obtained on loan upon application to its Publicity Department, Head Office, St. Helens, Lancs., its London office at Selwyn House, Cleveland Row, St. James's, S.W.1, or to any of its depots throughout the country.

Television Camera Cable

A multicore cable is produced by British Insulated Callender's Cables, Ltd., for use with the latest television outside broadcast equipment. This polythene insulated cable is the only link necessary between the camera and mobile control van for distances of up to 1,000ft, and is remarkably small and compact. Its facilities are unique, in that it is capable of handling video signals with low attenuation, scan currents, speech intercommunication, power supply, cue light circuits, etc., and, from the mechanical aspect, it possesses a high degree of flexibility and robustness with an overall diameter of only 0.85in.

English Electric Television Exhibition

In connection with the introduction of the English Electric Co.'s television receiver model 1550, described in our issue of 25th November, the company has staged an exhibition in its showrooms at Queen's House, Kingsway, London, W.C.2. This deals with the history of its subsidiary, Marconi's Wireless Telegraph Co., in radio and television, demonstrates the receiver, both in working order and in dismantled form, shows something of the English Electric group's resources in regard to all aspects of broadcasting, and gives visitors an opportunity to see themselves on the television screen, by the use of a Marconi television camera.

Section of the English Electric television exhibition at Queen's House, London

Cork Products Price Increases

Devaluation of the pound has brought about increases in the cost of raw cork, varying according to the quality. We are informed by the Cork Manufacturers' Association that the price advances which must ensue when present stocks are exhausted will not reflect the full devaluation ratio.

Projectors in the South West Pacific

A total of eighteen B.T.H. type 301 projectors are now installed and in use in the

Fiji group of islands and in such places as Tonga, Raturna and the Gilbert Islands in the South Pacific. Seven of the eight cinemas in Fiji have B.T.H. 16 mm. equipment. The projectors are mainly operated by comparatively inexperienced persons and owing to the isolation of many of the cinemas on some of the smaller islands, reliability is an essential requirement. However, even with servicing carried out at irregular intervals, not a single breakdown has been recorded during a performance since the first equipments went into service two years ago.

Electricity Teams in America

The half-way point in the American tour of the productivity teams from the British electricity industry was Washington, where

Last week the British electricity productivity teams who have been touring America visited the Waterside power plant of the Consolidated Edison Electric Co. The photograph shows a group in the control room

they went to the headquarters of the Economic Co-operation Administration and were welcomed by Mr. J. Fobes, Mr. C. Tyler Wood, assistant administrator, and Mr. Clinton Golden, labour adviser. Both Mr. W. Tulip, leader of the generation and transmission team, and Mr. R. B. Richardson, of Hull, leader of the distribution team, replied. Mr. Tulip said that the teams had received the utmost assistance in their search for information and had access to all that they desired. The generation and transmission team had been particularly interested in the speed with which Americans got new power stations running. They would like to be able to do the same in Great Britain. Mr. Richardson said that the teams had been very impressed by the way things were done in America and by the scale on which they were done.

Radio-Equipped Taxicab

Although many taxis have been equipped with two-way radio for some time, it was only last week that the Commissioner of Police approved the first taxicab to be fitted with "business radio" for duty in the streets of London. This is an "Oxford" car which is fitted with v.h.f. radio designed and manufactured by Marconi's Wireless Telegraph Co., Ltd.

A feature of the installation is that the driver can use his two-way radio without taking his eyes off the road or removing his hands from the steering wheel to pick up the microphone, which is installed at the top of the windscreen. To switch the microphone on and off the driver has a switch on the dashboard about 6in from the steering wheel. The complete installation is unobtrusive for the transmitter/receiver is under the driver's seat and the loudspeaker and control unit are built into the dashboard of the vehicle.

The type H.16 transmitter / receiver has an output power of 10 to 14 W depending on the frequency range used, and five frequency ranges between 36 and 174 Mc/s are available. It is in two units, transmitter and receiver, the combined overall measurements being 16in wide by 17½in deep by 8in high, and the total weight is 32 lb.

Both amplitude modulation and frequency modulation patterns are available and frequencies are crystal controlled.

Advertisement Correction

The South Western Electricity Board informs us that in its advertisement in our last issue for a district engineer for the West Devon district the salary should have read £665 per annum, Grade 3, Class E. Applications already received will be considered at the amended salary. The closing date has been extended to 24th December.

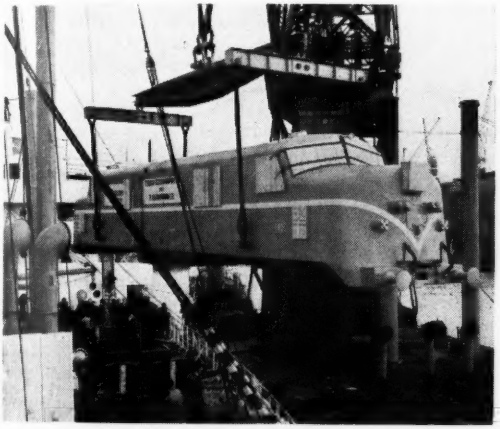
Cathedral Sound Equipment

Work has recently begun on the installation of Philips sound reproduction equipment in Exeter Cathedral. The installation work, together with the rewiring of the cathedral's electrical services, is being carried out by Garton & King, Ltd. The specification for the sound reproducing system, which embodies many new and interesting features, was drawn up by Hoare Lee & Partners, consulting engineers to the

Dean and Chapter, and the order was entrusted to the Amplifier Department of Philips Electrical, Ltd. The complete system comprises twelve microphones and thirty-two loudspeakers. These will be operated from a three-tier console-mounted equipment near the choir stalls. Automatic switching greatly simplifies the duties of the operator.

Electric Locomotives for Brazil

In our issue of 4th November last we described the fifteen 3,000 h.p. electric main line locomotives which the English Electric Co., Ltd., is constructing as part of the electrification scheme of the Estrada de Ferro Santos a Jundiai (E.F.S.J.), Brazil. The first of these to be completed was recently shipped at Liverpool Docks, and in the accompanying picture we show the locomotive being loaded on to the ship.



An English Electric locomotive being shipped to Brazil

New Bedlamp

In our description of the "Tamsa" bedlamp manufactured by Audigraph, Ltd., and marketed by Hugh S. McCullagh & Partners, Ltd. (*Electrical Review*, 2nd December, p. 1053) we stated that a special 15 W lamp is employed. Actually it is a normal 15 W pearl lamp.

Trade Announcements

The "Simpartex" drying cabinet which has previously been available from Exico, Ltd., is now exclusively marketed by **Chart Edge, Ltd.**, 44-45, Pall Mall, S.W.1.

The Holland House Electrical Co., Ltd., Glasgow, has formed a subsidiary with the title of Holland House Electrical Co. (Belfast), Ltd., at 2, Alfred Street, Belfast. Mr. G. W. Hamilton is managing director, and Mr. J. H. Dunlop, director and sales manager.

The Hull depot of **Enfield Cables, Ltd.**, has removed to 37, Salthouse Lane, Hull (telephone: Hull 35018). Mr. C. Wood is the depot manager.

Catalogues and Lists

General Electric Co., Ltd., Magnet House, Kingsway, London, W.C.2. — Catalogue H(5) of industrial and commercial air heating equipment.

Wandsworth Electrical Manufacturing Co., Ltd., 32, Frederick Street, Birmingham, 1. —Priced catalogue of electrical accessories.

Davis Sheet Metal Engineering Co., Ltd., 54, Islington Park Street, London, N.1.—Priced folder dealing with cable trunking with "quick-fix" covers.

Ferranti, Ltd., Hollinwood, Lancs.—Folder on miniature hermetically sealed transformers.

Porter Electrical Products, Ltd., 11, King's Road, Bramhope, nr. Leeds.—Descriptive leaflet on "Portaway" earth continuity conductors.

Sun Electrical Co., Ltd., 118/124, Charing Cross Road, London, W.C.2.—Priced catalogue of industrial and commercial lighting fittings, and another dealing with domestic appliances.

A. K. Fans, Ltd., 20, Upper Park Road, London, N.W.3.—Folder describing "Airmax" miniature pressure fans.

Information Department

THE extensive records of our Information Department enable us to reply to most queries, but occasionally we ask for our readers' assistance in tracing names and addresses not known to us. We should be glad to have such information regarding the makers of the following:—

"Bee" electric taps.
"Britannia" glassware.

General inquiries from readers relating to sources of electrical goods, makers' addresses, etc., are replied to by the Information Department through the post. Inquiries should be accompanied by a stamped addressed envelope.

NEW BOOKS

Elements of Electronics. By G. Windred, A.M.I.E.E. Pp. 197; figs. 100; index. Chapman & Hall, Ltd., 37, Essex Street, London, W.C.2. Price 15s.

This book by the late G. Windred, like his other works, is well written and easy to read, the style being purely descriptive. As the title implies, the scope is elementary. After a short historical survey of the researches leading to the measurement of electron mass and charge, the electron theory of the structure of matter is mentioned. Next, common methods of liberating electrons for use are described, followed by simple treatments of thermionic valves, photoelectric cells, amplifiers, oscillators, X-rays, cathode-ray oscillographs, etc. Television, radar, the betatron and cyclotron, electron optics and the sound film are also briefly described.

The book gives some idea of the variety of applications of electronic devices along with a little basic theory, but since so many aspects of the subject are discussed in less than 200 pages the scope of each section is necessarily very limited. A bibliography at the end of each chapter, however, gives titles of suitable publications for those who wish to carry their studies further.—L. W.

Radio Engineering. Vol. II. By E. K. Sandeman. Pp. 579; figs. and index. Chapman & Hall, Ltd., 37, Essex Street, London, W.C.2. Price 40s.

This was originally an instruction book for B.B.C. maintenance engineers, but was expanded to serve as a reference work for trained engineers. The second volume deals with balanced and unbalanced circuits, interference and noise, receivers, measuring equipment, equalizers compression and expansion, feedback, network theory and filters. Appendices cover, *inter alia*, formulæ, Fourier analysis, complex quantities, etc. For the greater part, the treatment is directed more towards practical questions than most textbooks on radio. This is not invariably so, and the sections on network theory and filters are more detailed than one would anticipate; in fact, these sections are more useful for reference purposes than the rest of the book.

It is easy to criticize a work of this sort, but the author has fulfilled his main promise and given a practical, fairly up-to-date and accurate survey of radio, excluding u.h.f. and pulse techniques.

As a work of reference the book could have been much improved by a better bibliography. Very few bibliographical references are made in the text and the main bibliography is notable for quantity rather than quality, besides containing no references after about 1942. The book should, however, be deservedly popular among maintenance and service engineers.—A. H. B.

Modern Electric Clocks. By S. F. Philpott. Fourth edition. Pp. 228; figs. 169; index. Sir Isaac Pitman & Sons, Ltd., Parker Street, Kingsway, London, W.C.2. Price 15s.

Since the last edition of this book was published, in 1938, so many developments have taken place in electrical timekeeping that it has been found necessary to rewrite practically the whole of the descriptive text. The volume presents a complete outline of the principles, construction and installation of typical clock systems, and gives guidance in the selection of the most suitable kind of clock for a particular application. It is written in a clear and concise manner from the practical viewpoint, and in such a way that it will doubtless be of value to a very wide range of readers.—R. P.

Books Received

Accumulator Charging.—By W. S. Ibbetson, B.Sc., A.M.I.E.E., Tenth Edition. Pp. 193; figs. 41; index. Sir Isaac Pitman & Sons, Ltd., Parker Street, Kingsway, London, W.C.2. Price 10s.

Hydraulics and the Mechanics of Fluids. By E. H. Lewitt, Ph.D., A.M.I.Mech.E. Eighth edition. Pp. 630; figs. 288; index. Sir Isaac Pitman & Sons, Ltd. Price 21s.

Introduction to Modern Radio. By F. L. Poyser, B.Sc. Pp. 232; figs. 180; index. University Tutorial Press, Ltd., Clifton House, Euston Road, N.W.1. Price 5s.

Fig. 1.—**Blackboard illuminated by two 4ft 40 W fluorescent daylight colour tubes which are concealed behind a canopy above the blackboard**

Blackboard Lighting

An Improved Method

By
K. OLDHAM SMITH*
A.M.I.E.E.

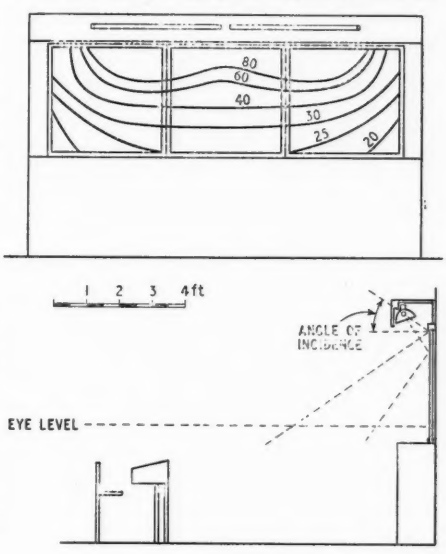
TO illuminate school blackboards it is usual to employ one or more parabolic angle fittings fixed to classroom ceilings directly or on short pendants. This method has two defects: first, owing to the projection distance, the light cannot be sufficiently accurately controlled to prevent spill illumination of the surrounds to the blackboard and, secondly, it is difficult to place fittings to light the board without specular reflection being apparent to some of the pupils.

Recently fluorescent tubes in trough reflectors have been used in a similar manner to parabolic angle reflectors and this has resulted in a considerable improvement in seeing conditions. Both specular reflection and spill illumination are still present, but the reflection is no longer uncomfortable owing to the increased size and lower surface brightness of the light source.

It was considered that a solution to the problem might be found by directing the light on to the board so that the angle of incidence was very large and so that no pupil would suffer from specular reflection. Experiments were carried out utilizing 5ft and 4ft fluorescent tubes in specially designed small metal trough reflectors white enamelled on their reflecting surfaces and with self-contained control gear fixed above the blackboard with minimum projection in front of it.

It was realized that the diversity of illumination on the surface of the blackboard would be large, but it was considered that this might not be objectionable if kept within reasonable bounds. It was expected that the black surface would be an almost total absorber of

Fig. 2.—Front view and sectional elevation of blackboard with isofootcandle contours showing the vertical illumination on the surface of blackboard with general lighting switched on



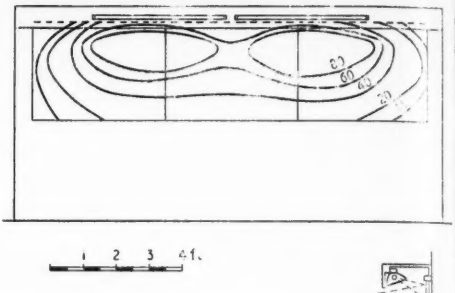
* The author is on the staff of R. W. Gregory and Partners, consulting engineers, Newcastle-on-Tyne.

light against which the white chalk would stand out in contrast and would reflect almost the whole of the light falling on it. In practice, the effect of lighting the board serves to accentuate the contrast between the black background and the white chalk markings and the considerable diversity in illumination between the top and bottom of the blackboard, though noticeable, proves to be no drawback.

It was found desirable to use "daylight" lamps to obtain a difference in colour to the tungsten general lighting and the effect was much improved by concealing the fittings behind a canopy supported by the cupboards on either side of the blackboard. The latter, being recessed, has the appearance of a miniature illuminated stage (Fig. 1) and helps to attract the pupils' attention.

As an experiment a blackboard was illuminated with fluorescent tubes as previously described, but the fittings were deliberately arranged as in Fig. 3 to introduce specular reflection on to the top portion of the blackboard. It was found that the diversity between the top and bottom of the blackboard was reduced and seeing conditions were equally satisfactory so long as the matt black surface of the board was maintained. As the surface deteriorated with use, however, the specular reflection became apparent, so that the seeing conditions were inferior to the arrangement shown in Fig. 2 where reflection into the scholars' eyes was impossible.

Fig. 3.—When fluorescent tubes project further from face of blackboard, specular reflection from the top portion of the board is apparent to pupils in front of classroom



All the tests were carried out with the general lighting switched on, the intensity in the classroom being 15 foot-candles measured horizontally on the tops of the desks.

This method of blackboard lighting has proved successful with blackboards which do not exceed 3ft measured from top to bottom, but it is doubtful if the same methods could be used with deeper boards, as the diversity between top and bottom might prove excessive.

Acknowledgments are due to Falk Stadelmann & Co., Ltd., who made the fittings and Watson Norie, Ltd., who carried out the installation work.

Liverpool Street Lighting

IN his annual report, the Liverpool city lighting engineer (Mr. C. C. Smith) states that out of the total of 731 miles of streets and passages, 384 miles are lighted by electricity. The policy of lighting all main traffic routes with sodium vapour discharge lamps has been further implemented. Owing to the accumulation during the war years of neutral faults on consumers' installations, the system of remote centralized control has been operating far below its pre-war efficiency. To rectify the erratic operation of lamps in certain areas, experiments have been made with alternative methods of injection of the high-frequency impulse and decentralization of control in particularly bad areas. Incorrect operations have been reduced by as much as 80 per cent in the last two years.

The total number of lamps now operated by this system from 49 control points is 6,537, of which 5,413 are operated by individual units from 38 transmitters, and 1,124 by 94 group units from 11 master switches.

The Street Lighting Committee has decided to include £17,500 in next year's estimates for converting gas lighting in passages to electric lighting.

Trolley-bus Overhead Equipment

SOME thirty-seven undertakings operate trolley-buses in this country and in spite of their proven efficiency the tendency nowadays is to replace them with oil or petrol driven vehicles at the end of their useful life. The cost of overhead line equipment is one of the reasons for this, and the economic factors involved were considered by Mr. A. D. Dix, in a paper delivered last Monday before the London Students' Section of the I.E.E.

A trolley-wire with a grooved cross-section is recommended in the relevant British Standard, and it may be suspended from a transverse-span wire, bracket arm, inverted-U tubular construction, or from the walls of buildings. The Ministry of Transport prefers the first method, which of course requires the use of vertical poles. Although existing tram-wire poles may be used, they usually need extra bracing to meet the safety regulations laid down.

Operating voltages between 500 and 600 are usual for trolley-buses and where an earthed return tramway system is in use there is a maximum permissible voltage drop of 7 volts/mile. All overhead-line systems have to be sectionalized every half mile, a fitting being used to maintain a through-path for the collecting shoes. It is interesting to note that M.o.T. regulations require that insulators supporting the line shall be checked for leakage current at regular intervals.

Poles for trolley-wires are erected not more than 120ft apart, the actual distance depending on suspension construction and road width. At curves, special arrangements are necessary as the deflection at a "pull-off" should not exceed 20 deg. Similarly, special gear is also required at junctions and cross-overs, and here the Minister of Transport also limits vehicle speeds to minimize the risk of de-wiring.

Value of Training

THE national lecture sponsored by the Association of Supervising Electrical Engineers was delivered at Bristol last week by Mr. A. G. Ramsey (Ministry of Works), president of the Association. Mr. S. F. Steward, chairman of the South Western Electricity Board, presided at the meeting.

Mr. Ramsey said that, although our industries had been developed from a sound basis of scientific and engineering knowledge with skill and ingenuity second to none, progress in the improvement of industrial productivity had been comparatively slow. He believed the remedy lay in the simplification of working methods, better training and the use of far more mechanization. One could not achieve greater production without spending money, but it must be spent in such a way as to ensure that the articles produced were saleable in all the appropriate world markets.

He saw no reason why supervising engineers in greater numbers should not occupy the higher posts, not necessarily those confined to the engineering side, in industrial concerns, and the chances of doing so would be enhanced by the Association widening its field of operation. He was convinced that England still retained the lead in engineering, but thought that the profession needed flexibility of mind to meet changing conditions and more imaginative vision.

Mr. Steward said that the nationalization of electricity had brought into focus the importance of the widest possible outlook in the field of management and administration. Engineers would make a mistake if they stressed the importance of engineering training and experience yet underestimated the value of experience and training in other fields. Engineers, who by their very keenness could become too narrow in their outlook and be restricted in their interests, should develop all the qualities needed by managers and administrators in large private or public enterprises.

It was not easy to fill the managerial posts in those large-scale organizations and he urged members of the Association to cultivate a broad outlook and wide interests and to recognize that engineering qualifications alone were not enough.

Oil Engine Costs

THE general form of the annual report prepared by the Diesel Engine Users' Association has been changed this year to make it more readily understandable, particularly by newcomers. The returns for 1947-48 indicate that 26 out of 47 stations were below the standard curve in respect of fuel oil consumption, which was 6.5 per cent better than the standard. The average for all stations was 0.601 lb/kWh generated at a running plant load factor of 64.8 per cent. A considerable number of stations used less lubricating oil than the accepted arbitrary figure though the average number of b.h.p.h. run/gal has fallen slightly as compared with the previous year. The total number of stations reported upon has increased by 15 to 64; a total of 155 engines at home of 43,481 kW generated 54.26 million kWh and 63 engines overseas of 32,752 kW generated 93.77 million kWh.

Brazilian Power Schemes

From a Correspondent in Brazil

THE Brazil National Department of Railways (Ministry of Communications and Public Works) is inviting tenders for the supply and installation of mechanical and electrical equipment for a 20,000 kW generating station, to be erected at Candiota, Municipality of Bagé, to supply power for the electrification of the Rio Grande do Sul railway. The installation is to include four boilers for steam generation, two turbine alternator groups of 10,000 kW, 3,000 r.p.m., 6,600 V, 50 cycles, and five transformer substations. The tenders will be opened at Porto Alegre, Rio Grande do Sul, on 10th January.

Plan to Double Output

Brazil's "S.A.L.T.E. Plan," now in its final stages in the Senate, provides for doubling the output of electrical energy within the next five years. The capacity of the existing generating stations in the Federal and State capitals is to be increased, new ones are to be built in districts of growing economic importance, and a large number of busy railway sections are to be electrified.

The Brazilian Traction, Light & Power Co. of Toronto and the American and Foreign Power Co., together with their affiliated concerns, are responsible for 66 per cent of the total capacity of 1.5 million kW, serving ten of the principal cities and one-quarter of Brazil's entire population. These two companies have undertaken to augment capacity by 700,000 kW during the next five years. Twenty-one smaller companies in the interior at San Paulo, Parana, Minas Geraes, Mato Grosso and Santa Catarina will increase their capacity by 175,000 kW.

The National Electrification Scheme, approved in 1944 and later embodied in the S.A.L.T.E. Plan, provides for the electrification of several railways; the distribution of electricity to urban and rural zones within the range of existing sources of supply; the building of new stations in agricultural and mining zones to permit of industrialization; and the linking-up of independent systems wherever practicable. This part of the Plan will be carried out by the Federal Government and will cost the Treasury £13,000,000. An additional sum of £7,000,000 is allocated to the organization of a national industry for the manufacture of heavy electrical material. The cost of electrical equipment to be imported from abroad is estimated at £6,000,000 per annum during the next five years.

The S.A.L.T.E. Plan was to have come into force in 1949, but has been subjected to many amendments in the Senate and Chamber of Deputies, all tending to enlarge its scope. Pending its final approval, Federal and State Governments are displaying unprecedented activity in the development of new sources of electrical energy to meet the growing needs of local industries. The Hydro-electric Company of the San Francisco Valley was established early in 1948, with mixed State and private capital, to harness the Paulo Afonso Falls, between Bahia and Alagoas. The potential of these falls is sufficient for 440,000 kW, but the initial programme provides for a power station with two generators of 56,000 kW each. Transmission lines will be erected to Caruarú, Pernambuco, Propria, Sergipe and Feira de Sant'Ana, Bahia, and secondary lines will radiate from these centres to Recife, Itabaina (Paraiba), Maceio (Alagoas), Aracajú (Sergipe) and Salvador (Bahia). Other lines will branch off to feed adjacent districts within a radius of 270 miles of the Falls. The cost of the work was originally estimated at £5,512,000, but is now calculated at £7,540,000. The International Bank for Reconstruction and Development has agreed to advance 15 million dollars towards the cost.

Other Projects

Other power stations are being built by the Minas Geraes State Government in accordance with a Recovery and Development Plan approved in 1948, and aided by grants from the Treasury. The waterfalls in Minas Geraes have a potential capacity of more than 6 million h.p., but only 200,000 h.p. is at present utilized. The scheme provides for bringing an additional 600,000 h.p. into service. The first station (80,000 h.p.) should be completed at Pilões in 1950, at a cost of £2,400,000. Work was begun this year on a 150,000 h.p. station at the Fecho do Funil Cataracts on the Paraopeba River, a tributary of the Upper San Francisco. In June last a contract was signed for the supply of equipment for another hydro-electric station at the Salte Grande Falls on the Santo Antonio River. The plant will include two 34,000 h.p. turbines. In September an agreement was signed between the Federal and State Governments for the progressive utilization of the hydraulic energy of the Pai Joaquim Falls, on the Araguari River.

Improved Poultry Appliances

Exhibits at Last Week's National Show

PHYSICAL limitations make it impossible for this country to grow all the wheat and rear all the cattle, sheep and pigs it needs. In the case of poultry, however, modern methods enable large flocks of birds to be maintained in a healthy state in a remarkably small space.

The commercial poultry keeper of to-day has at his disposal a large range of mechanical aids and labour saving devices to help in making production in this country competitive. Recent advances in the design of equipment were impressively demonstrated at Olympia last week at the three-day National Poultry Show organized by the *Poultry World* and the *Farmer and Stock-Breeder*. A tour of the trade stands, numbering some 130, left no doubt of the important part which electricity plays in the industry at the present time, from incubation to cooking poultry for the table, or in the comparatively new process of quick-freezing.

A good example of mechanization was to be seen on the stand of R. J. Patchett, Ltd., whose "Eggsellsior" battery cages incorporate an electrical cleaning system which enables up to 560 cages in one row to be cleaned in two minutes. Feeding and watering are automatically carried out by means of a travelling carriage (operated by a Crompton motor) which passes slowly from one end of the battery to the other. Saving in labour costs is estimated at £3 or £4 per week per 1,000 birds.

Incubators of many kinds were on view embodying a number of improvements in design. They included a Hearson all-electric air-conditioned cabinet model with extractor fitted to a separate hatching compartment, with heaters and thermostats of new design. Temperature is controlled to ±¼ deg F in any part of the machine. Cleaning is carried out by an Electrolux machine and a Deosan "Dynaliser" is incorporated. Exhibits by Horace W. Stephens and Sons included a 24,000-egg cabinet incubator with automatic turning gear operated by a ¾ h.p. B.T.H. motor and controlled by a Venner time switch. This model is also fitted with an electrode humidifier which passes a trickle feed of steam into the cabinet. At the other end of the scale S.P.B.A. Supplies, Ltd., showed their small "Electric Hen" incubator in which the heating unit consists of three electric lamps.

The "Three-in-one" chick rearing battery shown by John Shepherd & Sons, Ltd., is a good example of flexibility, being suited for rearing chicks from the day-old stage to four or five months. The electric brooder is fitted with "Mycalex" heater board thermostatically controlled by "Preselect" heat control dial. A radiant-heat brooder exhibited by Western Incubators, Ltd., has the thermostatic control calibrated in weeks.

Among the numerous types of ancillary apparatus on show was a new device, the Cope "Quikpik" drum plucker operated by a ½ h.p. motor. The equipment consists of a thermostatically controlled low-temperature water dip tank which is used in conjunction with a rotating drum plucker fitted with special rubber "fingers" that remove all feathers and stubs. It is claimed that two operators with limited skill can handle over two hundred birds an hour.

Spinks tray washing machines, Snowhite egg cleaning apparatus, the Bingham poultry plucker, "Laybat" electric cauterizer ("Clarbat," Ltd.) for wing pinioning, Curfew washing machines, various types of food mixers, mincers and shredders were among other electrically operated equipment shown.

In the cookery section "Chicken in the Kitchen," the Electrical Development Association staged frequent cookery demonstrations and exhibited the latest models of electrical apparatus including a refrigerator with deep-freeze compartment (Deepfreeze, Ltd.).

Plant Extensions in Victoria

THE State Electricity Commission of Victoria plans to double electricity production in the next five years. If this can be achieved, the State should be freed from the need for rationing after 1952. Additional oil-burning generating plant is being obtained from overseas. This includes a 30,000 kW generator and oil-fired boiler, both of British manufacture, which are to be installed at the Spencer Street, Melbourne, power station. Six diesel sets, each of 830 kW capacity, are on order from an Australian firm, and a 38,000 kW generator with two oil-fired boilers of a special type is being obtained from Switzerland.

FINANCIAL SECTION

Company News — Stock Exchange Activities

Reports and Dividends

Crabtree Electrical Industries, Ltd., held its annual meeting on 8th December, when Dr. H. Schofield (chairman) in the course of his speech, said that during the year under review their sales had reached record proportions and output had increased in almost every department. They were now beginning to benefit from decisions taken some time back when they started their new works at Wolverhampton, and a new assembly department at Brownhills. Developments in South Africa had been hampered by the recent policy of the South African Government which, by restricting imports, had virtually brought about a position amounting to stagnation. They were arriving at a position where they could give more reasonable delivery of many of their more popular lines. So far this year sales had been higher than during the corresponding period of last year.

The Rothermel Corporation, Ltd., reports a group trading profit for 1948 of £75,140, as compared with £118,038 for 1947. An interim ordinary dividend of 17½ per cent has been paid, but no final dividend is proposed. In the previous year the total ordinary distribution was 40 per cent.

The Perak River Hydro-Electric Power Co., Ltd., reports a revenue for the year ended 31st July last of £1,065,499, as compared with £791,503 for 1947-48. Malayan expenses absorbed £640,023, and after adding revenue from other sources, and providing for depreciation, debenture interest, United Kingdom and Malayan tax, etc., there is a profit of £85,863 (against £211,147), to which is added £3,035 brought in, plus compensation paid by British Military Administration £37,400. Contingency reserve receives £75,000, and £51,298 is carried forward.

J. & F. Stone Lighting & Radio, Ltd., held its annual meeting on 7th December. In his statement, which was circulated with the report and accounts, Mr. D. G. Nairn (chairman) says that sales during the past year were higher than ever before, and an increasing percentage of the turnover has been effected through the medium of hire-purchase agreements. The company and its subsidiaries now have 170 retail shops. Sales for the period from 1st July last show an increase over the corresponding figure of the preceding year.

Max Stone, Ltd., reports a consolidated trading profit for the year ended 30th June last of £232,605, as compared with £170,210 for the preceding year, and a net balance of £83,439 (against £58,012). The final ordinary dividend is 20 per cent (against 15 per cent), again making 40 per cent for the year. The balance carried forward is £50,956 (against £48,277 brought in from the last accounts).

Dewhurst & Partner, Ltd., report a trading profit for the year to 30th September last of £76,933, as compared with £73,371 for the preceding year, and a net profit of £32,125 (against £28,829). The dividend for the year is unchanged at 30 per cent, and the balance carried forward is £122,982 (against £100,757 brought in).

The Drayton Regulator Co. (Holdings), Ltd., has been formed to acquire as from 1st July last the capital of the Drayton Regulator & Instrument Co., Ltd., the operating concern. Rowe, Swann & Co. are arranging the placing of the whole of the 75,000 6 per cent redeemable preference £1 shares at par and 150,000 of the company's 750,000 ordinary 2s shares at 4s per share.

The General Cable Manufacturing Co., Ltd., reports a net profit for the year to 30th September last, before tax, of £83,480, as compared with £87,424 for the preceding year. Tax requires £45,500, and general reserve receives £15,000. A second interim dividend of 18 per cent, less tax, is paid on the capital increased by the bonus issue of two new ordinary shares for every three held. The dividend is to be recommended as a final for the year, and is equivalent to the 30 per cent final for the previous year, when the total distribution for the year was 50 per cent.

British Insulated Callender's Cables, Ltd., has declared an interim dividend of 2 per cent (unchanged).

Lightfoot Refrigeration, Ltd., has declared an interim dividend of 3 per cent (unchanged).

The Globe Telegraph & Trust Co., Ltd., has declared an interim dividend of 1 per cent, tax free (same).

The Lisbon Electric Tramways Co., Ltd., is paying an unchanged interim dividend of 2½ per cent, tax free.

New Companies

B. & E. Hardman, Ltd.—Registered 3rd December. Capital £1,000. Dealers in wireless and television sets and accessories, electrical appliances, etc. Directors: B. H.

Hardman and Mrs. Lilian Hardman. Regd. office: 267, Brownhill Road, Catford, S.E.6.

T. S. Boutagy & Sons (London), Ltd.—Registered 2nd December. Capital £100. Agents for and manufacturers of electrical fittings and appliances, radio and television equipment, electrical materials and plant, refrigerators, etc. S. J. Khouri, 178, Cromwell Road, S.W.5, is permanent director.

Chas. Jeremy (Electric), Ltd.—Registered 2nd December. Capital £1,000. Electrical engineers and general electrical installation contractors, etc. Directors: W. C. Jeremy and Mrs. Beatrice P. Jeremy. Regd. office: 56, Hasker Street, Chelsea, S.W.3.

Leigh Distribution (Southern), Ltd. Registered 5th December. Capital £1,000. Dealers in and factors and distributors of electric lamps, bells, fires, stoves, cookers, switchboards, etc. Directors: W. C. Trythall and H. F. E. Matthews. Regd. office; 61, Commercial Road, Portsmouth.

C. H. S. Cox & Co. (Electrical Contractors), Ltd. Registered 3rd December. Capital £100. To acquire the business of electrical contractors and engineers carried on by C. H. S. Cox & Co., at 36 and 37, Wood Street, Brighton. Directors: R. H. C. Cox and C. H. S. Cox. Regd. office: 36 and 37, Wood Street, Brighton.

Willesden Transformer Co., Ltd.—Registered 7th December. Capital £1,000. Manufacturers of electrical transformers, electrical and radio components and devices, etc. Directors: L. Mechulam and E. J. Woodrow. Regd. office: 28, Balmoral Road, Willesden Green, N.W.2.

Electralarms, Ltd.—Registered 6th December. Capital £2,000. Electrical, mechanical and general engineers and contractors, etc. Directors: V. C. Thompson, Florence Thompson, E. Studman and Nellie Dean. Regd. office: 19a, Islington Park Street, Islington, N.1.

Increases of Capital

Interoffice Telephones, Ltd.—Increased by £15,000, in £1 6 per cent cumulative preference shares, beyond the registered capital of £5,000.

Whitworth Electric Lamp Co., Ltd.—Increased by £45,000, in £1 ordinary shares, beyond the registered capital of £15,000.

Davey, Paxman & Co., Ltd.—Increased by £300,000, in 175,000 ordinary and 125,000 unclassified shares of £1 beyond the registered capital of £700,000.

Liquidations

Fylde Switchgear Co., Ltd.,—Members' voluntary winding-up. Meeting of members on 14th January at 23, Woodland Grove, Blackpool, to receive an account of the winding-up by the liquidator, Mr. R. H. Green.

Parker Radio Corporation, Ltd.—Particulars of claims by 22nd December to the liquidator, G. G. P. Goldney, 7, Laurence Pountney Hill, London, E.C.4.

Bankruptcies

E. Cheetham, electrician, formerly carrying on business at 377, Ashton Old Road, Manchester, as an electrical contractor.—Public examination 30th January, 1950, at the Town Hall, Ashton-under-Lyne.

R. H. Tuck, 7, Grand Parade, Upper Richmond Road, London, S.W.14, electrical engineer, and lately carrying on business with another as London Electrical Contractors, 109, Great Russell Street, W.C.1, and at 9, Newman Street, W.1, and also lately carrying on business with another as Brotherton & Tuck at 9, Newman Street, W.1.—Order made 1st November, 1949, suspending discharge for six months.

Trade Marks

APPLICATIONS have been made for the registration of the following trade marks. Objections may be entered within a month of 7th December.

BUSY BEE (design). No. 672,078. Class 7. Washing, mincing, mixing, welding, sewing, wringing, drying, bread-cutting, peeling, slicing, drilling, bottle-washing, dairy, ironing and hair-cutting machines, butter churns, lawn mowers, paint sprayers, egg heaters, air compressors, polishing machines (not for domestic use), centrifugal pumps included in Class 7, pressing machines for clothes and for textiles, hair clippers, hair-waving appliances and hand tools, all being electrically operated goods; and electric dynamos, sparking plugs, electric saw benches, alternators, generators and motors (not for land vehicles). BUSY BEE (design). No. 681,798. Class 10. Electrically heated blankets and electrically heated pads for personal use. BUSY BEE. No. 681,799. Class 14. Electric clocks.—Price & Co. (Manchester), Ltd., 50, Spear Street, Oldham Street, Manchester, 1.

RAYDEX. No. 680,051. Class 9, Electric coffee percolators, electric kettles and electric irons.—United Electrical Co. (Coolex), Ltd., 61, Chester Street, Aston, Birmingham.

BIROETTE. No. 680,376. Class 9. Cinematographic apparatus, electric vacuum cleaners, wireless receiving sets (complete), luminous advertising signs, telephones and thermionic valves, etc.—The Miles-Martin Pen Co., Ltd., Hawkhurst, The Aerodrome, Woodley, Reading.

TELE-VOX. No. 681,449. Class 9. Telephone amplifiers.—Tele-Vox (London), Ltd., 5, Bourne Street, Sloane Square, London, S.W.1.

SEALITE FOR BALANCED LIGHTING (design). No. 680,837. Class 11. Lamps included in Class 11; and fluorescent electric tubes for lighting purposes.—Sealite Industries, Ltd., 37 and 38, Venice Chambers, 61, Lord Street, Liverpool.

OLYMPUS. No. 681,129. Class 11. Electric lamp bulbs.—Olympic Lamps, Ltd., 15, Bury Street, London, E.C.3.

FINANCIAL SECTION
STOCKS and SHARES

THE customary seasonal influence of Christmas upon markets is making itself felt round the Stock Exchange. In the early part of the week, the effect of the Australian landslide was to induce a generally better tendency. This was noticeable more particularly in the Consol market, where Transport and Electricity Threes improved along with other gilt-edged stocks, though the rises were lost as it became apparent that there was no follow-through buying on the part of the public. Nor did the Government step in to provide any support.

The Week's Gains

Lucas ordinary at 82s 6d are 3s. 9d up. Lancashire Dynamo hardened to 92s 6d, Crompton Parkinson to 25s, Johnson & Phillips to 80s 9d. Tube Investments held their recovery at 5$\frac{3}{8}$. Radio Companies' shares are mostly better. Cossor at 7s 6d and E. K. Cole at 15s are both $\frac{1}{8}$ higher. De la Rue, 23s 9d, are 9d to the good. Ever Ready and Automatic Telephones show gains at 28s and 53s 3d respectively. Cable ordinary 237$\frac{1}{2}$ is 2 points higher, and Great Northern Telegraphs at 16 are equally better. A decline of 30 points in British Electric Traction deferred brought in buyers, and the price recovered to 1475. Ultra Electric firmed up to 3s 6d, and McMichael Radio to 3s.

Television

Radio & Television Trust 2s shares relapsed to 9d, and the £1 preference to 10s, on the depressing statement issued a week ago in advance of the accounts. This concludes that the bank indebtedness of £900,000 is too heavy in relation to the remaining manufacturing interests, and indicates that their sale is being negotiated. Pye deferred, 2s. 6d up at 28s 9d, have thrown off the effects of the recent fire.

J. & F. Stone

Dealers in radio and light electrical appliances are commonly supposed to have encountered difficult business conditions for a year or so past; the market was the more gratified, accordingly, with the preliminary results of J. & F. Stone Lighting & Radio. The net profit before tax is up by £30,000 at £306,000, and covers comfortably the repetition of the dividend at 40 per cent for the fourth successive year. The 5s shares have advanced to 15s. There is little in the latest results to explain quotation of the shares on a basis of yield running into double figures.

General Cable Dividends

The second interim (to be regarded as final) dividend of 18 per cent declared by General Cable Manufacturing is payable on capital as increased by last July's two-for-three share bonus. It affords a practical example of the effect on dividend rates of the many free capital bonuses distributed during the second half of this year. In the case of General Cables, five ordinary shares qualify for the payment previously paid on three shares. On the same basis, last year's total of 50 per cent represents 30 per cent on the new capital, and affords a yield of 8 per cent on the present price of 18s 9d for the 5s shares.

E.M.I.'s Foreign Interests

Electrical & Musical Industries present the results of their foreign subsidiaries' trading in an account separate from that of the British home and overseas group. Most of the limelight falls on the latter, with the result that a remarkable expansion in the foreign account, during the year ended last June, has generally received less than its due appreciation. Trading profits reached, in fact, the substantial figure of £670,000, leaving a net sum of £320,000 after foreign taxation and exchange losses. Only £51,000 of this was paid in dividend to the parent, so that the cover for the latter's 8 per cent distribution is, in effect, a good deal wider than is indicated by the British group's earnings of 19 per cent. Investments stand in the balance sheet at a figure of £2. The price is steady at 16s 3d.

Company News

The 2s ordinary shares of Dewhurst & Partners—the accounts were published last week—are quoted at 8s 3d, to yield 7$\frac{1}{4}$ per cent on the 30 per cent dividend. Net profits are a little better at £32,000, which is more than three times the amount distributed in dividend. Rothermel Corporation 1s shares have changed hands around 2s 3d since disclosure of the setback in earnings in the delayed accounts for 1948. No final dividend is being paid for that year, but an interim of 10 (against the previous 17$\frac{1}{2}$) per cent is declared in respect of the period ending this month. Perak River Hydro-Electric results came as a disappointment, in that a £275,000 expansion of revenue was nullified by an even large increase of expenses. There is consequently again no dividend, and the shares stand at 10s.

Electricity Supply

New Plant at Belfast : November Output Rise

ON Friday last a new Metropolitan-Vickers 30 MW turbo-alternator and Stirling boiler plant were formally inaugurated at the Harbour power station, Belfast. The set raises the total capacity of the station to 174·5 MW. The starting-up ceremony was performed by the Lady Mayoress of Belfast, who was accompanied by the Lord Mayor (Councillor W. E. G. Johnston), the city electrical engineer (Mr. W. J. McC. Girvan) and the chairman of the Electricity Committee (Councillor W. H. Cooper).

The Lady Mayoress of Belfast starting up the new set. Left to right : Mr. W. J. McC. Girvan, city electrical engineer, the Lord Mayor and Lady Mayoress, and Councillor W. H. Cooper, chairman of the Electricity Committee of the City Council

Supply in Lanarkshire

Two schemes to increase the supply of electricity in part of North Lanarkshire and the north-east of Glasgow have been adjudged essential and work estimated to cost £497,500 has been authorized, the S.W. Scotland Electricity Board announces. The schemes are designed to meet the increased demand due to the building of an industrial estate at Queenslie, off Edinburgh Road, Glasgow, and a projected housing estate between there and Millerston. A 33 kV extension is to be provided from Clyde's Mill power station to Millerston and Coatbridge and 11 kV reinforcements to Kirkintilloch and Airdrie. The Board states that as a result of the economies arising from the integration of the supply system within the area certain modifications to a scheme for the reinforcement of the supply to Coatbridge prepared by the former electricity undertaking have become possible and the Board's scheme will cost £150,000 less than the original proposals.

Devon Plant Transfer

The dismantling at the St. Austell power station of a 350 h.p. diesel engine coupled to a 282 kVA alternator has just been commenced by G.P.U., Ltd. (General Power Units, Service Division) in collaboration with British Railways. The plant is to be re-installed at East Yelland, North Devon, for use as a service set to the base load power station about to be built at this site. Besides the generating set the equipment to be transferred includes a cooling tower and three fuel storage tanks some 8 ft. in diameter and 30 ft. long. The whole installation lies in a very remote position on soft marshy ground and it is anticipated that sleeper roads will have to be laid down in order to move the fuel storage tanks, which weigh about 18 tons. As the nearest lane is some half a mile away, it will be necessary to move these heavy and bulky pieces of plant over a ditch and up a railway embankment. Site conditions are very similar at East Yelland (it has been found necessary to lay a 5 ft. concrete raft over the whole site). The plant has to be re-erected to form a complete working power station and this work will include the installation of a lighting scheme for the site. It is hoped that the work will be completed by the spring.

Lighting in N. Borneo

Wartime damage by bombing and fighting to the towns of Sandakan and Jesselton in British North Borneo laid waste many of the buildings and destroyed electric power stations. For some time oil lamps provided the only street lighting, but restricted electricity supplies are now available again and new lighting installations, although on a modest scale so far, are pro-

viding better illumination than before the war. The first of the new schemes was in the main street at Sandakan, for which the Singapore branch of the General Electric Co., Ltd., has supplied dome refractor lanterns with "Osram" 80 W high-pressure mercury vapour lamps. This was the first h.p.m.v. street-lighting installation in British North Borneo. At Jesselton, G.E.C. open conical type lanterns with "Osram" 100 W tungsten lamps are now in use.

Generation in November

The monthly statistics issued by the Ministry of Fuel and Power, set out in the accompanying table, show that in November 9.9 per cent more electricity was generated than a year ago. The average

	Fuel consumed Thousand tons		kWh generated Millions			kWh sent out Millions	Installed capacity (m.c.r.) MW
	Coal	Oil	Steam	Water Power	Total*		
British Electricity Authority ...	2,773	5.0	4,636	59	4,711	4,449	13,280
North of Scotland	22	1.1	34	62	100	98	325
Total for November, 1949 ...	2,795	6.1	4,670	121	4,811	4,547	13,605
Total for November, 1948 ...	2,607	4.7	4,231	127	4,378	4,136	13,173
Increase or decrease as a percentage of 1948	+7.2	+29.8	+10.4	−4.7	+9.9	+9.9	+3.3
Total for January–November, 1949	25,997	46.9	42,872	1,024	44,075	41,558	
Total for January–November, 1948	25,129	36.7	40,478	1,208	41,839	39,465	
Increase or decrease, per cent ...	+3.5	+27.8	+5.9	−15.2	+5.3	+5.3	

* The total figure includes generation by oil engines, refuse destructors and waste heat plants amounting to 11 million kWh, 0.3 million kWh and 9.1 million kWh, respectively in November, 1949.

increase for the eleven months of the current year to the end of that month was 5.3 per cent. Installed capacity at 30th November represented a net gain of 432 MW.

An Efficient Industry

Mr. M. A. Bulloch, chairman of the South Eastern Electricity Consultative Council, said at a meeting of the Council last week that when the annual report of the British Electricity Authority was issued he believed it would show that they belonged to the first nationalized industry to show a surplus.

This would be due, in his opinion, to the efficiency of control by Area Boards where it was clear that the experts were not subordinated to bureaucratic control. In consequence, there was a spirit of enterprise which would, he believed, produce a reasonable surplus on the undertaking. Subsequent years would, he hoped, reveal such a surplus that the boards would be able to take further action in regard to existing high tariffs.

Speaking on a notice stressing the need for testing electrical installations and apparatus, Alderman B. J. Watson, of the Kent District Committee, said they were mostly concerned with alterations made to house-wiring systems by incompetent amateurs. Extensions were being done by school-boys who had learnt a little about wiring at school and those alterations might be a danger to life and property. It was decided that a notice should be sent to consumers warning them that wiring and wiring extensions should only be carried out by competent electricians.

Rural Electrification

At a meeting of Rhuddlan Council it was reported that the Merseyside and North Wales Electricity Board had written stating that the Board had a long-term policy for North Wales, South Cheshire and North Shropshire. The aim would be to try to secure 100 per cent connection in each of the sections into which the areas had been split, to avoid the necessity of having to go back to the various parts. The complete scheme was the largest in rural development that had been contemplated in this country. Certain areas in North Wales had been allotted for immediate development but Rhuddlan was not in the first year's allocation.

Collier Launched

The first of four single-screw steamers which the British Electricity Authority has ordered from S. P. Austin & Son, Ltd., Sunderland, was launched on 5th December and was named *Mendip* by Lady Self, wife of Sir Henry Self, deputy chairman of the B.E.A. The vessel is of about 1,700 tons deadweight.

Hove Lighting Concession

Following a protest by Hove Town Council against the new tariff for street lighting, the South Eastern Electricity Board has offered to make a reduction of 13 per cent, but the Council must pay the new tariff after the current financial year.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (2s each) may be obtained from the Patent Office, 25, Southampton Buildings, W.C.2.

1941

11402. Oppegaard, K. F.—Recording of rapidly varying electrical voltages. 6th September, 1941. (632354.)

1944

3943. Mullard Radio Valve Co., Ltd., and Heins, A. J. Van Der Ven.—Voltage stabilizing circuits. 2nd March, 1944. (Addition to 568446.) (632494.)

22922. Sperry Gyroscope Co., Inc.—Radio systems and apparatus particularly for use in aircraft landing. 3rd September, 1943. (632357.)

24610. Berry, A. F.—Heating of soil and the like and means therefor. 8th December, 1944. (Cognate application 17707/45.) (632566.)

1945

16880. Hurley, Jun., S. C.—Apparatus for controlling the flow of current through an electronic circuit for the photoelectric inspection of articles. 20th July, 1944. (632424.)

21961. Igranic Electric Co., Ltd.—Load-relay circuits for induction motors. 31st August, 1944. (632571.)

24747. Igranic Electric Co., Ltd.—Alternating-current motor drives and control. 23rd September, 1944. (632572.)

33733. Brush Electrical Engineering Co., Ltd., and Rayer, F. H.—Pillars and vehicle bodies incorporating the same. 13th December, 1945. (632639.)

34696. British Thomson-Houston Co., Ltd., and Mortlock, J. R.—Protection of polyphase electric motors. 21st December, 1945. (632426.)

1946

5475. Plessey Co., Ltd. — Electric high-frequency vibrator. 22nd February, 1945. (632642.)

13903. Standard Telephones & Cables, Ltd., and Hinton, L. T.—Multiplex carrier signalling systems. 8th May, 1946. (632647.)

14040. Compton Organ Co., Ltd., J., and Bourn, L. E. A.—Electrical musical instruments. 9th May, 1946. (632648.)

14266. Marconi's Wireless Telegraph Co., Ltd.—Circuits comprising reactive loads. 11th May, 1945. (632365.)

14541. McClements, A.—Manually operable selector levers, switches and the like. 14th May, 1946. (632649.)

15011. Standard Telephones & Cables, Ltd.—Radio direction finders. 21st May, 1945. (632366.)

20604/51. Bendix Aviation Corporation.—Electrical plug-and-socket connectors. 18th August, 1945. (632501/2.)

22213. Cinema-Television, Ltd., and Chapter, C. F.—Television and like transmission systems. 25th July, 1946. (632651.)

22687. Bendix Aviation Corporation.—Electrical connectors. 18th August, 1945. (632503.)

23792. Marconi's Wireless Telegraph Co., Ltd.—Conversion of direct current to alternating current. 11th August, 1945. (632369.)

23859. Western Electric Co., Inc.—Signal transmission systems incorporating volume limiters. 18th September, 1945. (632370.)

24156. Westinghouse Electric International Co.—Dynamic balancing machines. 31st August, 1945. (632652.)

25608. Shawinigan Chemicals, Ltd. — Electrically heated gaseous reaction furnaces. 23rd October, 1945. (632504.)

26208. Standard Telephones & Cables, Ltd., and Pheazey, J. R.—Flexible sheathed electric cables and their manufacture. 30th August, 1946. (632657.)

26788. Marconi's Wireless Telegraph Co., Ltd.—Discriminators and detector circuits for angle-modulated waves. 6th September, 1945. (632374.)

26858. Philips Lamps, Ltd.—Mixing circuit arrangements. 27th March, 1943. (Cognate applications 26859/46, 26860/46 and 26861/46.) (632658.)

28006. Philips Lamps, Ltd.—Coated welding rods for electric arc welding. 11th March, 1942. (632660.)

29653. Standard Telephones & Cables, Ltd., Ranson, D. H., Roberts, W. L., and Taplin, R. H.—Switching systems. 4th October, 1946. (632375.)

29654. Standard Telephones & Cables, Ltd., and Roberts, W. L.—Electric pulse systems. 4th October, 1946. (632376.)

29679. Stivin, J.—Thermionic valve circuits. 24th November, 1942. (632433.)

30715. Laws, C. A., and Buckingham, J.—Time base generators. 15th October, 1946. (632434.)

30789. Corbusier, L., and Molinet, A.—Vibratory and acoustic device applicable particularly to the earpieces of telephone apparatus. 9th May, 1946. (632662.)

31118. Marconi's Wireless Telegraph Co., Ltd., and Green, E. — Electron-discharge tube circuit arrangements. 18th October, 1946. (632664.)

32298. Sperry Gyroscope Co., Inc.—Rotor balancing machines. 30th October, 1945. (632666.)

36166. General Aniline & Film Corporation.—Electron multiplier tube circuits. 15th February, 1946. (632378.)

36925. British Insulated Callender's Cables, Ltd., and Sweetland, A. G.—Electricity meters. 14th December, 1946. (632508.)

38063. Compagnie des Machines Bull.—Keyboards especially for electrically controlled accounting or card-punching machines. 2nd October, 1945. (632379.)

38065. Sangamo Weston, Ltd.—Electrical measuring instruments. 8th May, 1946. (632673.)

1947

131. Standard Telephones & Cables, Ltd. (International Standard Electric Corporation). — Phase shifter. 2nd January, 1947. (632674.)

2437. Chance Bros., Ltd., and Hallett, L. B. H.—Alternating electric current generating systems. 27th January 1947. (632381.)

2626. Westinghouse Electric International Co.—Alternating current circuits incorporating a capacitor. 20th April, 1943. (632436.)

4249. Marconi's Wireless Telegraph Co., Ltd.—Dials for radio receivers and the like. 14th February, 1946. (632511.)

6316. Rangabe, A. R., and Buckingham, J.—Supports for filaments of thermionic valves. 6th March, 1947. (632384.)

6533. Si-Liang, Y., and Chan, T. Y.—Electric battery lamps. 7th March, 1947. (632512.)

7805. Western Electric Co., Inc.—Piezo-electric crystal elements and apparatus. 4th April, 1946. (632515.)

9131. Harris, K. E., and Court, G. W. G.—Radar displays. 3rd April, 1947. (632689.)

9502. Westinghouse Electric International Co.—High-frequency coupling apparatus. 29th March, 1943. (632691.)

9882. English Electric Co., Ltd., Howard, R. J. F., and Warburton, E. T.—Apparatus for determining and comparing colour content. 14th April, 1947. (632593.)

14270. British Thomson-Houston Co., Ltd.—Processing of synthetic rubbers. 29th May, 1946. (632390.)

14271. British Thomson-Houston Co., Ltd.—Pneumatic vibrator machines. 29th May, 1946. (632596.)

15378. Standard Telephones & Cables, Ltd., and Kelly, R.—Electric power supply systems. 11th June, 1947. (632523.)

15405. Hazeltine Corporation.—Wave-signal transformer. 26th June, 1946. (632392.)

16910. General Electric Co., Ltd., and Clayton, R. J.

—Electric filters for radio frequency oscillations. 26th June, 1947. (632397.)

19280. Standard Telephones & Cables, Ltd.—Electro-magnetically controlled two position indicators. 24th August, 1946. (632404.)

20357. Holmes, E. P.—Insulated electric cables. 28th July, 1947. (632534.)

20658. Westinghouse Brake & Signal Co., Ltd.—Remote control systems. 28th March, 1940. (632605.)

21210. Faximile, Inc.—Variable frequency vacuum tube oscillator. 10th August, 1946. (632408.)

22328. Automatic Telephone & Electric Co., Ltd., and Baker, G. T.—Electronic counting circuits. 12th August, 1947. (632411.)

23645. Prendergast, C. S., Prendergast, R. S., and Dixey, G. W. B.—Rotary pumps and motors. 27th August, 1947. (Cognate application 27484/47.) (632414.)

25402. General Electric Co., Ltd., and James, E. G.—Crystal contact devices. 17th September, 1947. (632419.)

26793. Kemp, K. W. L.—Electro-magnetic relays. 6th October, 1947. (632448.)

28022. Reyrolle & Co., Ltd., A., Young, A. F. B., Lackey, C. H., and Howe, H. D.—Electric control circuit-arrangements. 20th October, 1947. (632454.)

28640. McKellar, O. A.—Table top refrigerators. 27th October, 1947. (632545.)

28864. Weber, H.—Electric connector devices of the plug-and-socket type. 30th October, 1946. (632460.)

28915. Hauersiev, W.—Electrical push-button switching devices. 14th November, 1946. (632546.)

29510. Drayton Regulator & Instrument Co., Ltd., Grover, R. V., and Forster, R. R.—Apparatus for controlling the flow of fluid through an electrically operated valve. 5th November, 1947. (632548.)

30002. General Electric Co., Ltd., and Dovey, D. M.—Methods of and apparatus for the continuous annealing of brass and the like alloys. 11th November, 1947. (632613.)

30329. Evershed & Vignoles, Ltd., and Perry, C. E.—Measurement of electrical resistance. 14th November, 1947. (632465.)

30894. Westinghouse Electric International Co.—Single-phase induction motors. 21st November, 1946. (632468.)

31040. Ericsson Telephones, Ltd., and Mitchell, J. H.—Systems comprising vibratory invertors. 24th November, 1947. (632469.)

32464. English Electric Co., Ltd., and Deriaz, P.—Runners of hydraulic machines. 9th December, 1947. (632475.)

32967. Lucas, Ltd., J., and Wood, J. L.—Electric battery lamps. 15th December, 1947. (632478.)

33984. Wolf & Co., Ltd., S., and Gubbins, C. H.—Power-operated portable hand-tools. 23rd December, 1947. (632485.)

34222, Aluminium Co. of America.—Joining of electrical conductors. 28th December, 1946. (632487.)

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254. Wipac Development, Ltd., and Valentine, J. G.—Electric lamps for vehicles. 3rd January, 1948. (632616.)

2144. General Electric Co., Ltd., and Baker, W. F.—Electric welding. 23rd January, 1948. (632623.)

Next Week's Events

Monday, 19th December

BIRMINGHAM.—Imperial Hotel, 6 p.m. I.E.E. South Midland Supply and Utilization Group. "Substations, with particular reference to Yorkshire Practice," by L. H. Fuller and C. R. Clarke.

BOURNEMOUTH. — Wedgewood Restaurant, 7.15 p.m. A.S.E.E. Bournemouth Branch. "History of Clocks," by Mr. Marshall.

CARDIFF.—At the South Wales Institute of Engineers, Park Place, 6 p.m. I.E.E. Western Utilization Group. "Some Aspects of Agricultural and Horticultural Electrification in North America," by F. E. Rowland.

LONDON.—Savoy Place, London, W.C.2, 5.30 p.m. I.E.E. Radio Section. Informal lecture on "The Acoustics of Studios and Auditoria," by W. Allen.

Tuesday, 20th December

BIRMINGHAM.—Midland Institute, 6 p.m. I.E.E. South Midland Centre. "Electricity in the Service of Man," by Dr. P. Dunsheath. (Joint meeting with the Midland Branches of the Institutions of Civil and Mechanical Engineers.)

COVENTRY.—Coventry Electric Club. "The Electrical Installation of a Viscose Rayon Factory," by C. F. Freeman.

GLASGOW.—At the Institution of Engineers and Shipbuilders, 39, Elmbank Crescent, 7 p.m. I.E.E. Scottish Centre. "Overhead Line Regulations," by H. W. Grimmitt.

At the Institute of Engineers and Shipbuilders, 7 p.m. Illuminating Engineering Society, Glasgow Centre. "Influence of Artificial Lighting on Industrial Health," by H. H. Bell.

LONDON.—Lighting Service Bureau, 2, Savoy Hill, W.C.2, 6.30 p.m. Association of Supervising Electrical Engineers. "The Impact of Electricity on Medical and Surgical Practice," by Dr. P. Bauwens.

Wednesday, 21st December

COVENTRY.—The Butts, 7 p.m. A.S.E.E. Coventry Branch. "Mercury Arc Rectifiers and their Applications."

EDINBURGH.—Welfare Club Hall, City Lighting and Cleansing Department, 7 p.m. Illuminating Engineering Society, Edinburgh Centre. "Colour in Lighting." by C. J. King.

MANCHESTER.—Engineers' Club, 7.30 p.m. A.S.E.E. Manchester Branch. "Brains Trust."

NEWCASTLE-ON-TYNE.—Neville Hall, 6 p.m. British Institution of Radio Engineers, North-Eastern Section. "A Review of the Basis of Electronics," by C. Laverick.

SHEFFIELD.—At the Sheffield Metallurgical Club, 7.30 p.m. Junior Institution of Engineers. "Civil Engineering Works in Connection with the Manchester-Sheffield-Wath Electrification," by A. S. Young.

Thursday, 22nd December

NEWCASTLE-ON-TYNE.—I.E.E. North-Eastern Students' Section, 6.30 p.m. Visit to the short-circuit testing plant of A. Reyrolle & Co., Ltd.

High Vacuum Technique

A COURSE of six lectures on "High Vacuum Technique" will be held at the South East London Technical College, Lewisham Way, S.E.4, on Mondays, commencing on 9th January. The fee for the course is £1, and particulars can be obtained from the Electrical Engineering Department of the College.

CONTRACT INFORMATION

ACCEPTED TENDERS AND PROSPECTIVE ELECTRICAL WORK

Contracts Open

Where "Contracts Open" are advertised in our "Official Notices" section, the date of the issue is given in parentheses.

Bath.—Education Committee. Contractors desirous of tendering for Phase II of the electrical installation at Moorlands Estate new junior school must submit their names to the architects by 21st December. (9th December.)

Brazil.—RIO DE JANEIRO.—3rd January. Director-General of Posts and Telegraphs. Land line or radio link equipment between Rio de Janeiro and Sao Paulo. (C.R.E. (I.B.) 35421/49. Ten/826.)*

10th January. Director-General of the National Railway Department. Equipment for power station at Candiota, including four water tube boilers, two 10,000 kW turbo-generators, sub-stations, etc. (C.R.E. 35426/49. Ten/828.)*

Belfast.—City Council. 5th January. Electric cable and fittings. Manager, Ormeau Road Gasworks.

6th January. Electricity Department. Electrical stores. (9th December.)

Camberwell.—9th January. Borough Council. Electric lamps for one year from 1st April, 1950. J. Clapp, borough engineer, Town Hall, S.E.5.

Carlisle.—City Council. Electrical installations in 64 houses. City engineer, 18, Fisher Street, Carlisle.

Edinburgh.—31st December and 7th January. North of Scotland Hydro-Electric Board. 33 kV and lower voltage overhead lines. (9th December.)

Egypt.—CAIRO.—18th April. Ministry of Public Works, Mechanical and Electrical department. Electric pumping station and cable line at Ameria, Qualubia Provinces. (C.R.E. (I.B.) 32698/49. Ten/1789.)*

Erpingham.—31st December. Rural District Council. Wiring of houses in course of erection. G. L. Evatt, architect, Council Offices, St. Peter's Road, Sheringham.

Merton and Morden.—28th December. U.D.C. Street lighting installation. (9th December.)

Middlesbrough.—Town Council. Renewal of electrical installation at Central Baths. Borough engineer, Municipal Buildings.

New Zealand.—WELLINGTON.—7th March. State Hydro-Electric Department. Three 11 kV voltage regulating outdoor transformers. (C.R.E. (I.B.) 34566/49. Ten/807.)*

14th March. One 45-ton, 4-motor electric overhead crane. (C.R.E. (I.B.) 34563/49. Ten/805.)*

2nd May. Turbines and generators for the Whakamaru power station. (C.R.E. (I.B.) 34083/49. Ten/800.)*

21st February. Public Works Department. Two 10-ton traversing cableways for Roxburgh power scheme. (C.R.E. (I.B.) 35958/49. Ten/820.)*

Portsmouth.—City Council. Electrical installation at Paulsgrove Primary School. (See this issue.)

Portugal.—LISBON.—6th January. Directorate General of Colonial Development. Material for the new distributing system of electric power to Lourenco Marques, Portuguese East Africa. (C.R.E. (I.B.) 33760/49. Ten/813.)*

*Specifications may be inspected at the Commercial Relations and Exports Department, Board of Trade, Thames House North, Millbank, S.W.1. Victoria 9040.

Orders Placed

Gillingham (Kent).—Corporation. Electrical installation in a further seventy houses (£2,250). —Lauray Electrical Co., Ltd.

London.—L.C.C. Electrical installation at Latimer Road School, Hammersmith (£1,867). —Lauray Electrical Co., Ltd.

Norwich.—Wiring south wing of Norwich Technical College.—Eastern Electricity Board.

Wakefield.—Corporation. Street lanterns, etc., for the conversion of the street lighting in Northgate, Leeds Road and Bradford Road from gas to electricity (£1,884).—G.E.C.

Contracts in Prospect

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Barnet.—Junior school, Whitings Hill; Allen Fairhead & Sons, Ltd., builders, Sydney Road, Enfield.

Boston.—Flats (80), Brothertoft Road; borough engineer.

Chelmsford.—Workshop and commerce blocks at the Mid-Essex Technical College, Moulsham Street; H. Conolly, county architect, County Hall, Chelmsford.

Cheshire.—Schools at Pensby, Bromborough, Stockton Heath, Knutsford, Weaverham and Rudheath; E. M. Parkes, county architect, The Castle, Chester.

Eccles.—Houses (60); borough engineer.

Edinburgh.—School of agriculture, King's Buildings, West Mains Road, for East of Scotland College of Agriculture (£350,000); R. Cowan and A. Reiach, joint architects, Edinburgh.

Flints.—Technical college (£430,000); Alun Edwards & Co., builders, Cefn-y-Bedd, Flints.

Gloucester.—Junior schools at Coney Hill and Elmbridge Road, and extensions to technical college; A. Morgan, city architect, Suffolk House, Greyfriars, Gloucester.

Hayes (Middx).—Reinstatement of factory buildings for Ministry of Works; Leightons (Contractors), Ltd., 10, Chandos Street, W.1.

Hillingdon.—Secondary school (£251,700), Court Road, for Middlesex E.C.; county architect, 10, Great George Street, S.W.1.

Hull.—Rebuilding three ward blocks at Kingston General Hospital for Leeds Regional Hospital Board; W. A. Shee, secretary to the Board, 29-31, Eastgate, Leeds, 2.

Huyton-with-Roby. — Extensions, Council Offices (£20,000); K. Pilkington, surveyor, Council Offices, Derby Road, Huyton.

Jarrow.—Houses (254), South Leam Lane; borough engineer.

London.—BATTERSEA. New wing and additional storeys, Battersea Polytechnic; Campbell Jones & Sons, architects, 9, Dowgate Hill, London, E.C.4.

LEWISHAM. — Crematorium, Hither Green Cemetery (£51,400); borough engineer, Town Hall, Catford, S.E.6.

HACKNEY.—Flats, Darenth Road (18) and Holly Street (26); borough engineer.

MARYLEBONE.—Office block, 181, Marylebone Road; Peter Caspari, architect, 20, Dorset Square, N.W.1.

Macclesfield.—Houses (40), Ivy Road estate; Hugh Owen & Sons, Ltd., Stockport.

Maidstone.—Houses (66); borough engineer.

Egg packing station; Kent Egg Packers, Ltd., The Dormy House, Tovil.

Manchester.—Single-storey dwellings (22), Toronto Gardens, Baguley, and 183 houses and 34 cottage flats at Northern Etchells; city architect.

New office block, etc., at Withington Hospital for Regional Hospital Board (£22,233); Moston Brick & Building Co., Ltd., Kenyon Lane, Collyhurst, Manchester.

Middlesbrough.—Houses, Beechwood; Hudson Brothers, builders, Fidler Street (30 houses) and Dawson (Estates), Ltd., builders, Billingham-on-Tees (34).

Newhaven.—Two blocks of four flats each and eight houses, Meeching estate, for U.D.C.; A. Underdown, architect, 9, Hyde Gardens, Eastbourne.

Nottingham.—Houses (40), Bilborough; Hutchinson & Rostance, Ltd., 2, King's Meadow Road.

Orrell.—Houses (38) and 24 bungalows, Moor Road estate; F. Butterfield, surveyor to U.D.C.

Peterborough.—Houses (90), Crown Street; city engineer.

Poole.—Houses (114); borough engineer.

Porthcawl.—Houses (46), Wilderness site; A. C. Rees, suveyor, Urban Council Offices.

Portsmouth.—Houses (72), Leigh Park; city architect, 1, Clarence Parade, Southsea.

Redditch.—Administration block at Ipsley Sewage Works; E. Buckley, engineer, The Council House.

Salcombe.—Block of shops and offices, Fore Street and Clifton Place; A. S. Parker & Allen, architects, 30a, Fore Street, Kingsbridge.

Seaton Valley.—Houses (48), Blyth Street estate, for the U.D.C.; J. E. Gardner, Ltd., builders, St. Cuthbert's Road, Gateshead.

Sedgefield.—Houses (64), at Sedgefield, Trimdon and Ferryhill; R.D.C. surveyor.

Skelton (Yorks).—Houses (40), Brotton Coach Road estate; U.D.C. surveyor.

Smethwick.—Works extensions; Evered & Co., Ltd., founders, Surrey Works, Smith Street.

Southport.—New wing, including workshops, at technical college (£66,150); R. E. Perrins, town clerk, Town Hall.

South Shields.—Flats (108), Prince Edward Road East; borough engineer.

Stalybridge.—Two - storey block of flats, Stocks Lane; Howard & Benson, architects, 88, Mosley Street, Manchester.

Stockport.—Houses (128), Houldsworth estate; W. Farley & Co., Ltd., Stockport.

Houses (52), Lowndes Lane & Chorlton Grove; J. J. Oakes & Sons, Ltd.

Stoke-on-Trent.—Five blocks of five-storey, one block of three-storey flats, Bold Street, Hartshill, and 144 houses, Furlong Road, Tunstall; city architect.

Stourport-on-Severn.—Houses (48), Walshes Farm estate; Godwin, Clist and Greenway, architects, Bank Buildings, Kidderminster.

Stretford.—Three-storey blocks of flats, Urmstone Lane; borough engineer.

Sunderland.—Houses (950); borough engineer.

Warrington.—County primary school, Long Lane; borough engineer, Town Hall.

Wellingborough.—Health Clinic (£30,500) for Northants C.C.; county architect, Northampton.

Wrexham.—Houses (127), Little Acton; borough architect.

New plant and buildings at works; British Celanese, Ltd., 22, Hanover Square, W.1.

York.—Extensions to Art Gallery and School of Art; C. J. Minter, city engineer, Guildhall.

Electric Railway Traction

THE Traction Technical Committee of the I.E.E., acting on behalf of the Council and in collaboration with members and others professionally engaged with British Railways and industry, has arranged a convention on electric railway traction to be held at the Institution from 20th to 23rd March, 1950.

The convention, which will be opened by the President will comprise an opening meeting and six technical sessions. The papers have been specially written for the convention and arranged in groups with a view to ensuring co-ordinated discussions.

At the opening meeting and in the second technical session a review of railway electrification will be presented, in which both the practice of British Railways and London Transport will be covered.

In subsequent sessions more detailed aspects of the subject will be introduced. The thirty papers to be presented will subsequently be published together with the discussions in a special issue of the Proceedings of the Institution.